PRELIMINARY

LIARD RIVER HYDROELECTRIC DEVELOPMENT SOILS, SURFICIAL GEOLOGY AND LANDFORMS INVENTORY

A report to

BRITISH COLUMBIA
HYDRO AND POWER AUTHORITY

PLEASE NOTE

The information in this document may be incomplete and is subject to amendment as a result of subsequent studies.

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PRELIMINARY

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Chapter 1

INTRODUCTION

1.1 PURPOSE

This report summarizes an inventory of soils, surficial geology and terrain carried out in the Liard River basin in northern British Columbia and southern Yukon. The study was initiated to provide base information for a variety of environmental studies related to the possible development of future dams and reservoirs on the Liard River in British Columbia.

The study was carried out under terms of reference provided by British Columbia Hydro and Power Authority dated May 16, 1980:

> The studies described in these terms of reference should provide a broad descriptive background of the physical features of the landscape and a detailed descriptive framework for use in the vegetation, forestry, wildlife, recreation, agriculture, land-use planning and other relevant components of the detailed environmental studies.
>
> (a) Describe the landforms and the nature and origin of the materials that comprise them. The description should include, but not be restricted to, the following:
>
> 1. the preparation of a terrain map of the study area at a scale of 1:100,000: the Terrain Classification System (E.L.U.C. Secretariat 1976) should be used as a basis for the classification of units;
> 2. the preparation of a soil map of the study area at a scale of 1:100,000: the Canadian System of Soil and Soil Climate

Classification (Canada Department of Agriculture 1978) should be used as a basis for the classification of units;

3. field descriptions for terrain and/or soils which should include coordinates, elevation, climate, slope angle and aspect, soil permeability and infiltration, genetic materials plus textures and degrees of compaction of soils; in addition, the stratigraphy of surface materials, drainage patterns and river systems, slope stability and local topography should be described; other aspects of the description should follow the system outlined by the Resource Analysis Branch (R.A.B.) of the Ministry of Environment; examples of appropriate site and soil description forms are attached.

4. the examination, sampling and analysis of major soils and soil profiles in conjunction with the agriculture, forestry and wildlife subgroups of the environmental studies; the profiles should identify thicknesses, colours, textures, structures, consistency, root development and moisture content; analytical information on selected critical areas and including pH, organic carbon, nitrogen, calcium, magnesium, sodium potassium, phosphorus, sulphur, iron, manganese, extractable aluminium and particle sizes should be obtained;

5. landforms which, because of their number, size, scarcity or state of preservation, make them unusual and of particular value as recreational resources.

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6. soil forming processes in the study area, noting any effects of reservoir development on soil types and development (e.g. development of new wetland, dusting at low water, etc.)

7. background information on physiographic regions and the Quaternary history of the study area; the Quaternary history should make specific reference to prominent geomorphic features and surficial deposits.

The terrain and surficial geology of the region are treated in Part One of this report; the pedologic portion of the study is treated in Part Two. Terrain and soils are mapped on 39 1:100,000 scale topographic maps prepared from standard National Topographic Series (NTS) maps. The limits of mapping shown on Fig. 1-1 are based on study area boundaries provided by B.C. Hydro in the terms of reference. The 39 terrain maps and 39 soils maps are bound separately as Appendices A and B of this report.

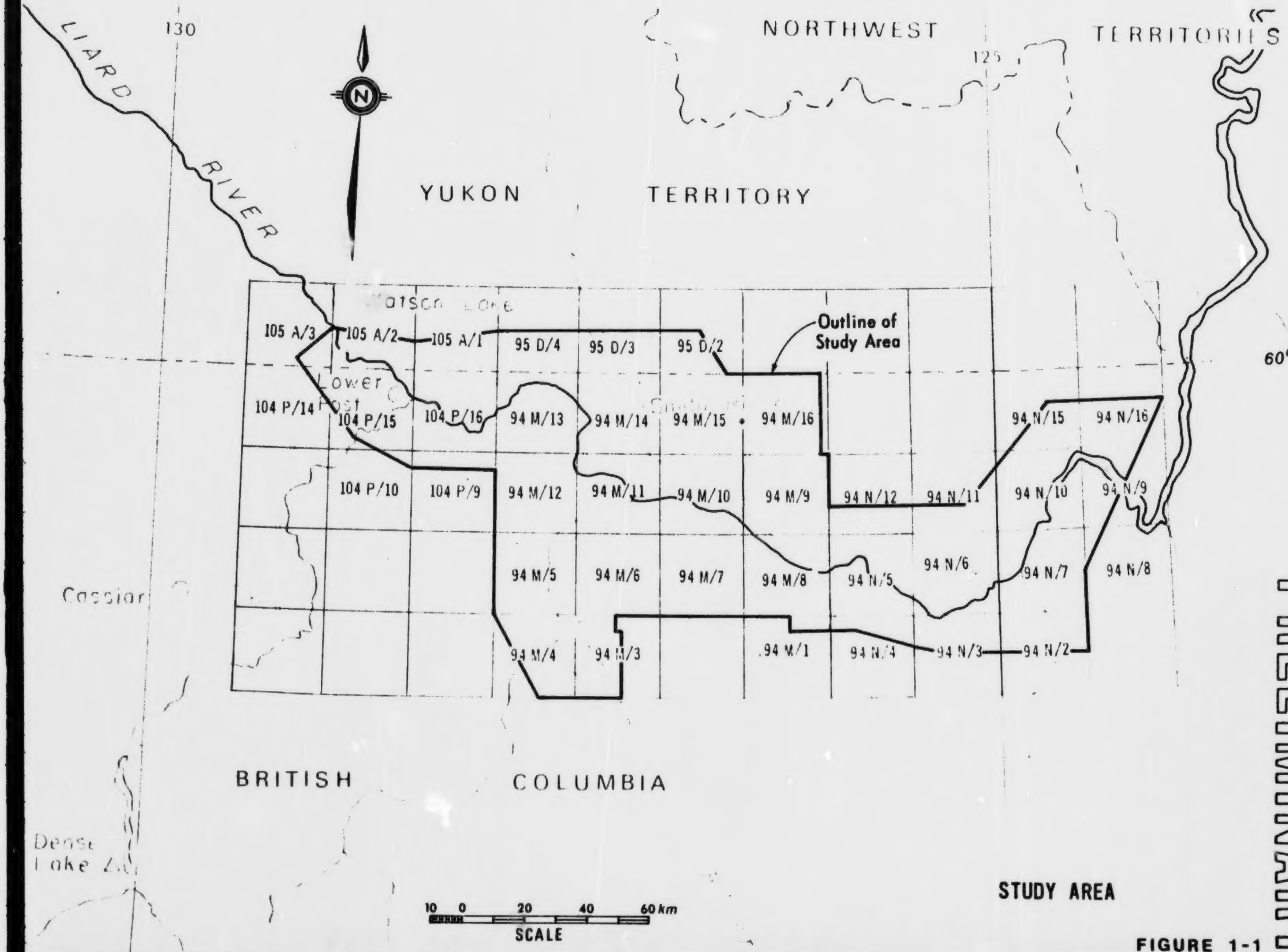
1.2 STUDY PROCEDURE

The study was completed by air photo interpretation of terrain on each of the 39 map sheets. The terrain was mapped on a reconnaissance level using the ELUC Terrain Classification System (1976); the pedologic mapping followed using the terrain sheets as base maps. Most of the air photos range in scale from 1:50,000 to 1:80,000 and were taken by the Federal Government in various years from 1960 to 1979. B.C. Government photos were used to cover gaps in the smaller scale photo coverage.

Fieldwork in support of the study was completed in August (2 days) and September (10 days)of 1980. The pedologic fieldwork was limited by adverse weather during the autumn of 1980. Members of the Thurber study team (Gerath and Morgan) spent 9 days in the region for a previous related study in 1979. Field work closely related to the terrain portion of this study was also carried out in the first half of June, 1981 by MacLean and Gerath.

The work was carried out in accordance with Thurber Consultants' proposal dated July 9, 1980 and was authorized in a letter from Mr. H.J. Goldie, Manager of the System Engineering Department of B.C. Hydro, dated July 19, 1980.

The study team includes Roxanna Beale-Kuurne, P.Ag. as pedologist and Robert F. Gerath, engineering geologist with Beverly MacLean and Marilynn Hunter, geomorphologists. Graham C. Morgan, P.Eng. was Review Principal for Thurber Consultants and Dr. Harold M. Etter was, for a time, the study coordinator for Thurber Consultants. Robert F. Gerath was the study coordinator after Dr. Etter's departure.


NORTHWEST TERRITORIES
YUKON TERRITORY
BRITISH COLUMBIA
LIARD RIVER
130
125
60° N
N
Watson Lake
Lower Post
Cassiar
Dease Lake
Outline of Study Area
105 A/3
105 A/2
105 A/1
95 D/4
95 D/3
95 D/2
104 P/14
104 P/15
104 P/16
94 M/13
94 M/14
94 M/15
94 M/16
94 N/15
94 N/16
104 P/10
104 P/9
94 M/12
94 M/11
94 M/10
94 M/9
94 N/12
94 N/11
94 N/10
94 N/9
94 M/5
94 M/6
94 M/7
94 M/8
94 N/5
94 N/6
94 N/7
94 N/8
94 M/4
94 M/3
94 M/1
94 N/4
94 N/3
94 N/2
10 0 20 40 60 km
SCALE

STUDY AREA

FIGURE 1-1

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PART ONE : SURFICIAL GEOLOGY AND LANDFORMS

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Chapter 2

PHYSIOGRAPHIC DESCRIPTION

2.1 PHYSIOGRAPHIC SUBDIVISIONS

The study encompasses a variety of physiographic regions within the Liard drainage area of British Columbia and a portion of the Yukon. Fig. 2-1 shows the principal physiographic subdivisions as described by Bostock (1948) and Holland (1964). Table 2.1 summarizes the general characteristics of each physiographic area. Further details are given in the sections which follow and in marginal notes which accompany the terrain maps in Appendix A.

2.2 BEDROCK GEOLOGY

The bedrock geology of the region has been mapped by Taylor and Stott (1980) and Gabrielse (1962, 1963 and 1966). Fig. 2-2 is a generalized map of the study area rock lithologies. The entire area is underlain by sedimentary bedrock of Pre-Cambrian to late Tertiary age. The Liard Plain, which covers most of the western portion of the study area, has only widely scattered bedrock exposures because of the extensive mantle of Pleistocene drift (Gabrielse, 1962, 1963 and 1966). Carbonate rocks dominate in the Liard Plain, the Rocky Mountains and western portions of the Liard Plateau. The rocks over most of the region are variably folded and faulted; the Mesozoic age sandstones and shales of the Alberta Plateau are broadly folded and have comparatively shallow dips.

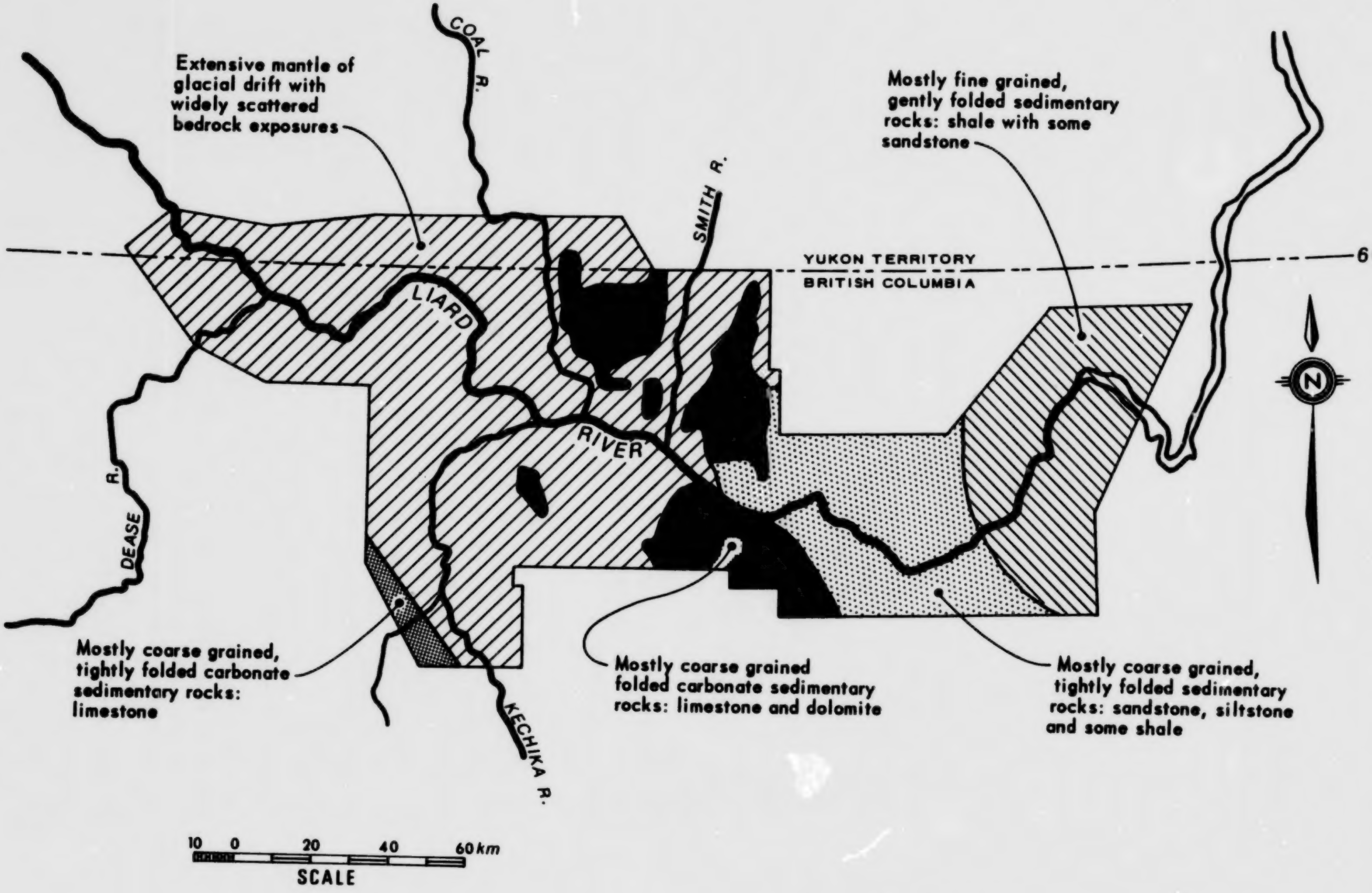
2.3 LIARD RIVER PROFILE

This study covers approximately 450 km of the Liard River from near the junction of the Fort Nelson

TABLE 2.1

CHARACTERISTICS OF THE PRINCIPAL PHYSIOGRAPHIC SUBDIVISIONS OF THE STUDY AREA

	Geology	Terrain	Glaciation
ALBERTA PLATEAU	Gently dipping to flat lying Cretaceous sedimentary rocks. Some folded Triassic units on the western margin.	Flat with incised valleys. Rolling uplands along western margins.	Western limit of the Alberta Plateau approximates the western limit of Laurentide Ice Sheet. Fine grained till and glacial lake deposits are often thick.
ROCKY MOUNTAIN FOOTHILLS	Folded and faulted Mesozoic sedimentaries.	Structurally controlled NW-SE trending ridges and other low mountains.	Eastern limit of the foothills approximates the eastern limit of Cordilleran Ice Sheet.
LIARD PLATEAU	Folded and faulted Paleozoic and Mesozoic sedimentaries often in N-S trending structures.	Rounded and flat-topped ridges and summits and local sharp, structurally controlled ridges.	Eastern limit of the plateau approximates the eastern limit of Cordilleran Ice Sheet.
ROCKY MOUNTAINS	Folded and faulted Paleozoic and Mesozoic sedimentary and metamorphic rocks.	Complex mountainous topography.	Local centers of Cordilleran ice accumulation with some summits unglaciated during most recent glacial maximum.
RABBIT PLATEAU	Northwesterly plunging folded sedimentary rocks of Paleozoic and pre-Paleozoic age.	Decreasing elevations between the Rocky Mountains and Liard Plain. Low wooded ridges with relief up to 915 m.	Covered with Cordilleran ice. Much till terrain with outwash features concentrated in narrow valleys.
LIARD PLAIN	Folded and faulted Mesozoic, Paleozoic and earlier sedimentary and metamorphic rocks.	Glaciated upland surfaces cut by meltwater channels and major river valleys. Valley sides may show moderate relief.	The Liard plain was covered by glacial ice. Numerous drumlins on upland surfaces with local large expanses of glaciofluvial, glaciolacustrine and more recent stratified deposits in valley areas.
ROCKY MOUNTAIN TRENCH	Downfaulted linear basin, possibly of young (Pliocene) geologic age.	Broad valley bottom, sharply defined by steep slopes to the east and west. Merges north with Liard Plain.	Covered by Cordilleran ice with late northward ice flow parallel to valley axis. Extensive areas of outwash over glaciolacustrine sediments.
KECHIKA RANGES	Folded Pre-Cambrian and Paleozoic sedimentary rocks.	Much rugged high-relief terrain. Summits below 1830 m often rounded by glaciation	Mostly covered by Cordilleran ice with some peaks unglaciated. Late glacier flow from some deep valleys.

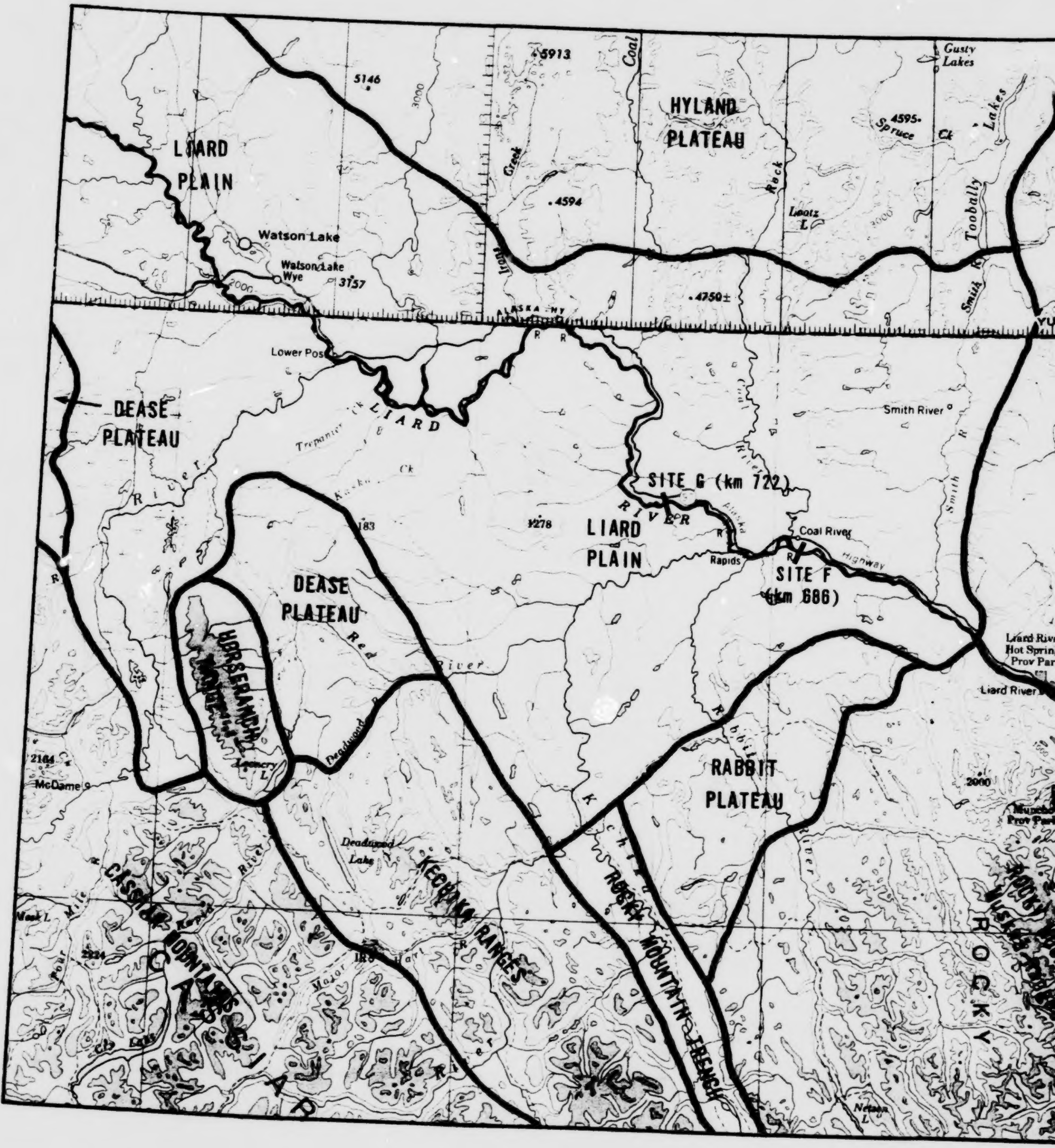

Extensive mantle of glacial drift with widely scattered bedrock exposures
COAL R.
SMITH R.
Mostly fine grained, gently folded sedimentary rocks: shale with some sandstone
YUKON TERRITORY
BRITISH COLUMBIA
60° N
N
LIARD
RIVER
DEASE R.
KECHIKA R.
Mostly coarse grained, tightly folded carbonate sedimentary rocks: limestone
Mostly coarse grained folded carbonate sedimentary rocks: limestone and dolomite
Mostly coarse grained, tightly folded sedimentary rocks: sandstone, siltstone and some shale
10 0 20 40 60km
SCALE

Source: Gabrielse (1962, 1963 and 1966 and Taylor and Stott, 1980)

GENERALIZED MAP OF STUDY AREA
ROCK LITHOLOGIES

FIGURE 2-2

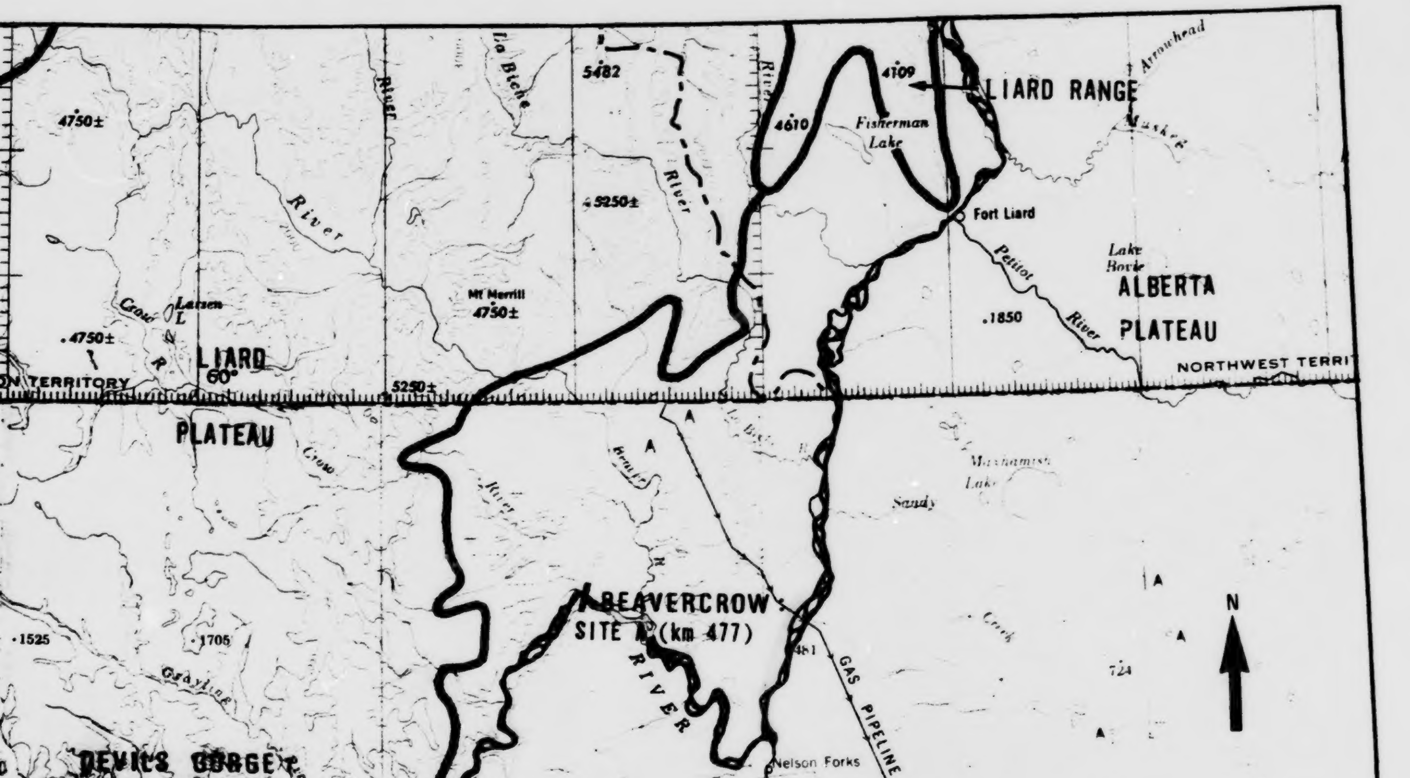
PRELIMINARY


LIARD PLAIN
HYLAND PLATEAU
Gusty Lakes
5913
5146
3000
Coal
Creek
4595
Spruce
Ck
Lakes
4594
Rock
Lootz L
Toobally
Watson Lake
Watson Lake Wye
3157
2000
Irons
Smith R
4750±
ALASKA HY
R
Lower Post
DEASE PLATEAU
LIARD
Trepanier Ck
Kaska Ck
River
Coal River
Smith River
Smith
SITE G (km 722)
RIVER
R
Alaska
183
1278
LIARD PLAIN
Coal River
Rapids
Highway
SITE F (km 686)
DEASE PLATEAU
HORSERANCH RANGE
Red
River
Liard River Hot Springs Prov Park
Liard River
Deadwood
Rabbit
RABBIT PLATEAU
2164
McDame
Mackenzie L
2000
Muncho Prov Park
Deadwood Lake
KECHIKA RANGES
ROCKY MOUNTAIN TRENCH
Kechika
River
CASSIAR MOUNTAINS
Four Mile
Major Hart
1893
Dease L
2334
Cry Lake
CASSIAR
Netson L
ROCKY
MUSKWA RANGES

SCALE 1:1,000,000

Kilometres 10 5 0 10 20 30 40 50 60 70 80 90 100 110
1 Millimetre = 1 Kilometre

World Air Chart Series


LIARD RANGE
4109
4610
5482
4750±
5250±
Mt Merrill
4750±
Fisherman Lake
Fort Liard
Petitot River
Lake Bovie
ALBERTA PLATEAU
.1850
NORTHWEST TERRITORIES
YUKON TERRITORY
LIARD PLATEAU
60°
5250±
Larsen L
Crow R
.4750±
La Biche River
Arrowhead
Muskeg
Maxhamish Lake
Sandy
Creek
724
N
BEAVERCROW SITE B (km 477)
481
GAS PIPELINE
LIARD RIVER
Nelson Forks
.1525
.1705
Grayling
DEVILS GORGE SITE E (km 608)
Rapids
ALBERTA PLATEAU
Kiwigana River
596
Fort Nelson River
Snake River
ROCKY MOUNTAIN FOOTHILLS
MUNCHO LAKE PROVINCIAL PARK
Muncho Lake
Toad River
Dunedin
Fort Nelson
Muskwa
2314
.1490
Steamboat

REGIONAL PHYSIOGRAPHIC SUBDIVISIONS

FIGURE 2-1

River in British Columbia to the upper Alaska Highway bridge crossing in the Yukon*. The Liard and its tributaries display diverse fluvial characteristics; many river sectors are locally graded to bedrock (Fig. 2.3).

Changes in the Liard River gradient are also caused by areas of fluvial deposition; an excellent example of this is seen on Fig. 2-3 at km 500 where coarse alluvial fan deposits issue from the Scatter River and Chimney Creek.

Major knickpoints in the Liard River profile are located in the area between the Coal River and Fireside (vicinity of km 700) and at Devil's Gorge (Site E, km 600). In several river sectors (e.g. Grand Canyon of the Liard) tributary streams flow into the Liard River over falls or rapids thus indicating the continuing incision of the Liard. Large falls or rapids exist on the lowermost reaches of the Smith and Rabbit Rivers.

2.4 ALBERTA PLATEAU (NTS 94/N2, 7, 8, 9, 10, 15, 16)

This area consists of flat, often muskeg covered lowlands (Photo 2.1) and upland surfaces formed by gently dipping, resistant Cretaceous sandstones and conglomerates. Glacial drift and bedrock have been considerably incised by rivers such as the Liard, the Beaver, the Scatter and the Toad near the western

---

*The Liard River is stationed every 10 km on the maps in the Appendix; the stationing is given to facilitate location references. The stations were provided by B.C. Hydro for an earlier project (Thurber Consultants Ltd., 1980) and begin with km 0 at Fort Simpson on the McKenzie River, NWT.

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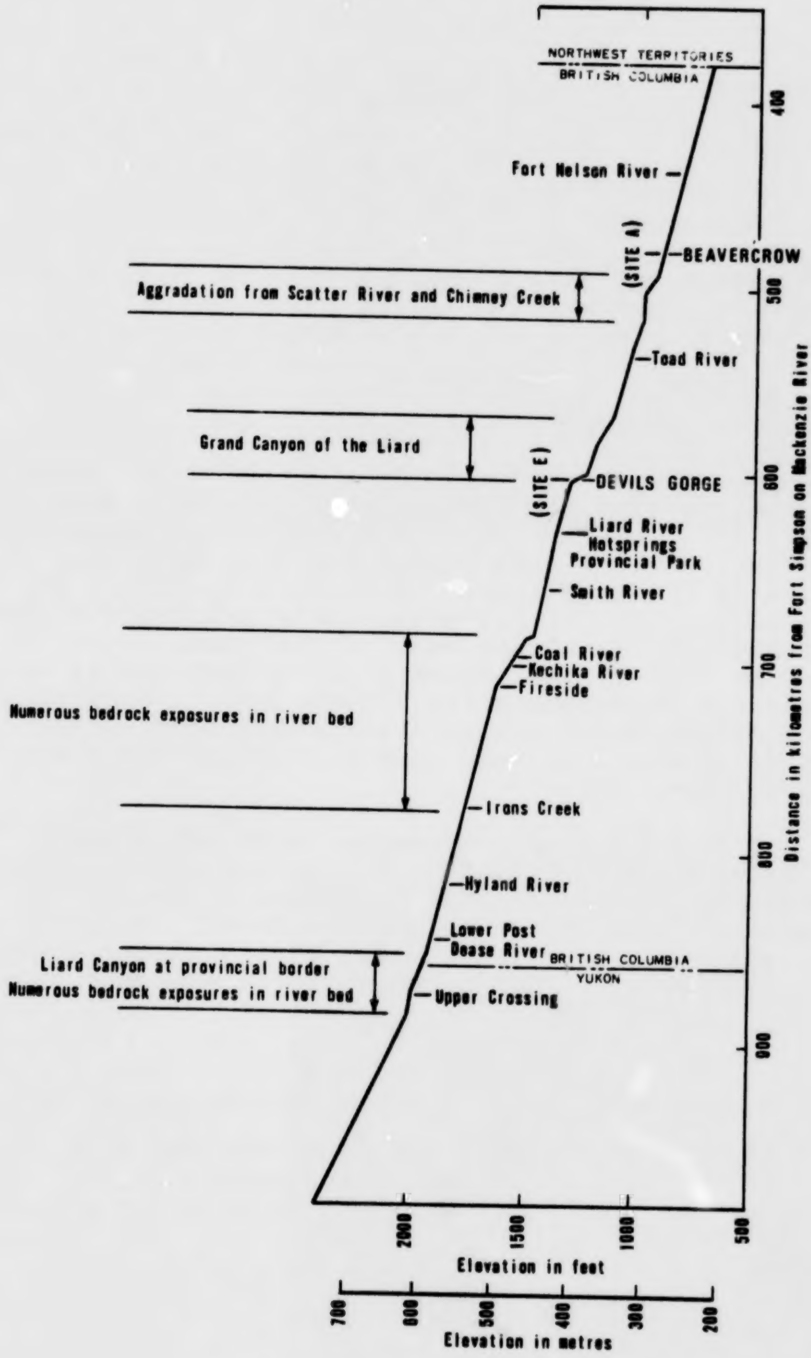

FIGURE 2-3

LONGITUDINAL PROFILE OF THE LIARD RIVER

limits of the plateau (Photo 2.2); the great expanse of the Fort Nelson Lowland lies to the east.

The bedrock geology here is relatively simple and well known compared to the area to the west. Dipping structures with resistant lithologies form prominent terrain features and bedrock landslides of great dimensions (Photo 2.3) occur along the Liard River and many of its tributaries. A ridge formed of Dunvegan Formation conglomerates is breached by the Liard River at the Beavercrow dam site (Photo 2.4).

Fig. 2-4 is a geologic map showing the general geology of the Liard River area from Hell Gate to near Site A*. This map shows how the Liard crosses the strike of major fold structures from Hell Gate to the area of the Toad River. From here to Site A the river parallels the strike; major rockslides have occurred on bedrock dip slopes west of the river (Photo 2.5) and on high-relief slopes incised into shales and multiple sandstone units (Photo 2.6). These slides and others which are derived from fine-grained glacial drift (Photo 2.7) make this portion of the Liard River study area unique.

Many of the surface deposits on the plateau consist of silt and clay in till and glacial lake deposits derived from the Fort Nelson Lowland by the westward flowing Laurentide Ice Sheet. This ice sheet extended to about the western limits of the Alberta Plateau where it coalesced with the eastward flowing

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*A new reconnaissance-level geologic map with the same scale is available (Taylor and Stott, 1980). The newer map confirms the essential geologic elements of Fig. 2.4.

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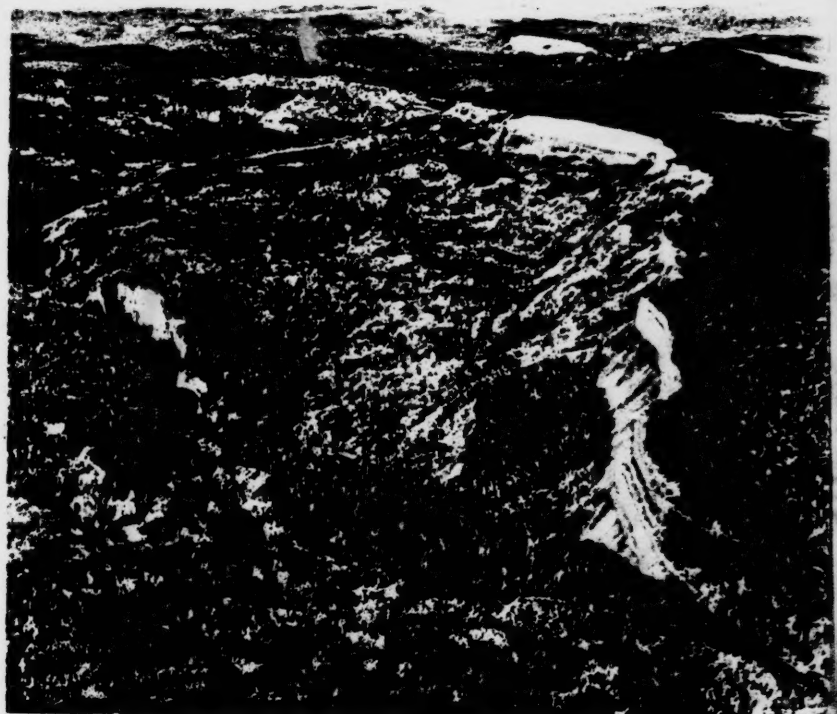
PHOTO 2.1 - Looking north from the area of Beavercrow (Site A) showing strike ridge formed of resistant conglomerates bounding lowland terrain to the east and west.

PHOTO 2.2 - Looking east up Chimney Creek from the Liard River at km 518. The incised sandstone has failed laterally on underlying shale. The entire valley is covered by debris.



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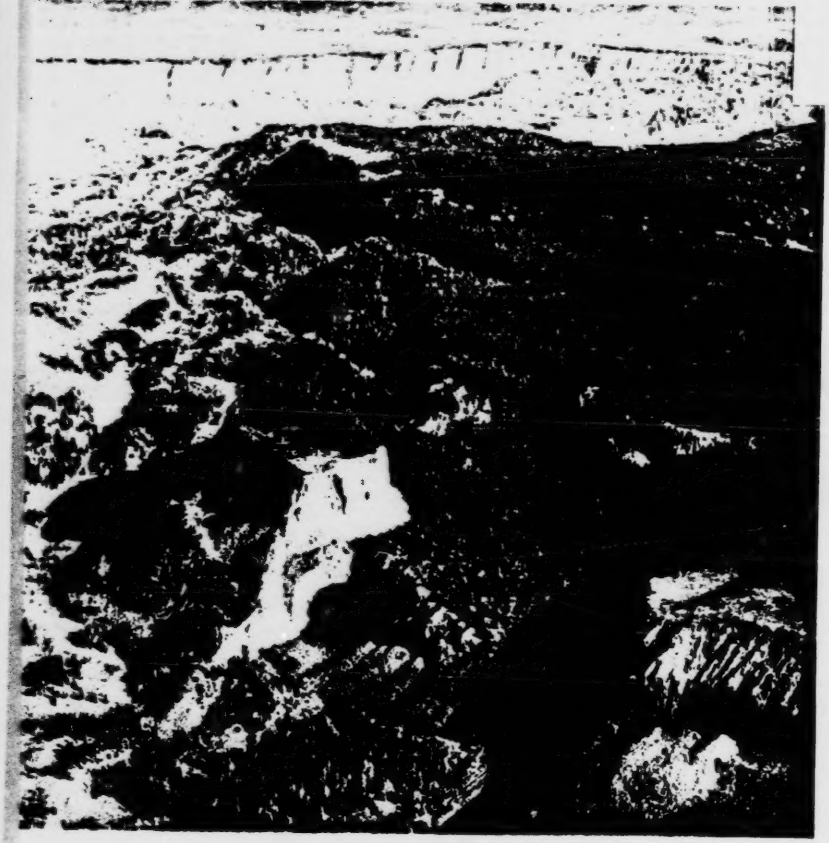

PHOTO 2.3 - This view was taken on the Scatter River beyond the proposed Beavercrow reservoir limit. It shows well the lateral movement of the sandstone face and grabens behind.

PHOTO 2.4 - Site A where Liard River has breached the prominent strike ridge and flows across lowlands beyond. View eastward.

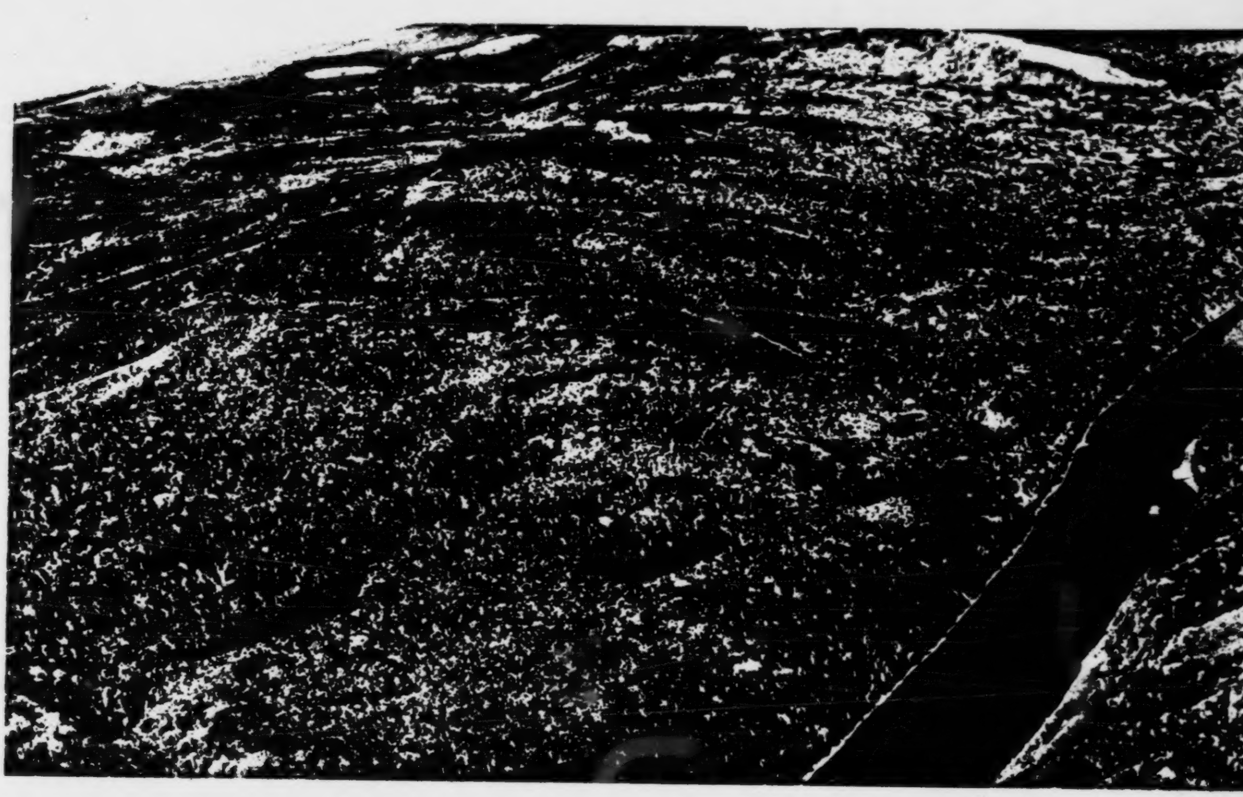

PHOTO 2.5 - Dip Slope Slide - View showing the left bank of the Liard River in the Beavercrow Reservoir area between km 521 and 524. Note the sandstones over shale dipping toward the river in the exposure in the background of the photo. The sandstone has failed down the slope (note ponds in foreground) and the debris has pushed the river over. The dip slope is 15° to 20°.

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PHOTO 2.6 - Rotational Rock Slump and Debris Slide - Complex landslide terrain on right bank of Liard River looking upstream between km 510 and 515. Some deep seated rotational bedrock failures are evident near the top of the slope where sandstones and conglomerates are failing over shales. Shale slides and movements involving previously failed materials are also common on this slope; many of these are evident on the surface and flanks of the mid-level plateau. River erosion at the toe of this slope has also reactivated some slide debris.

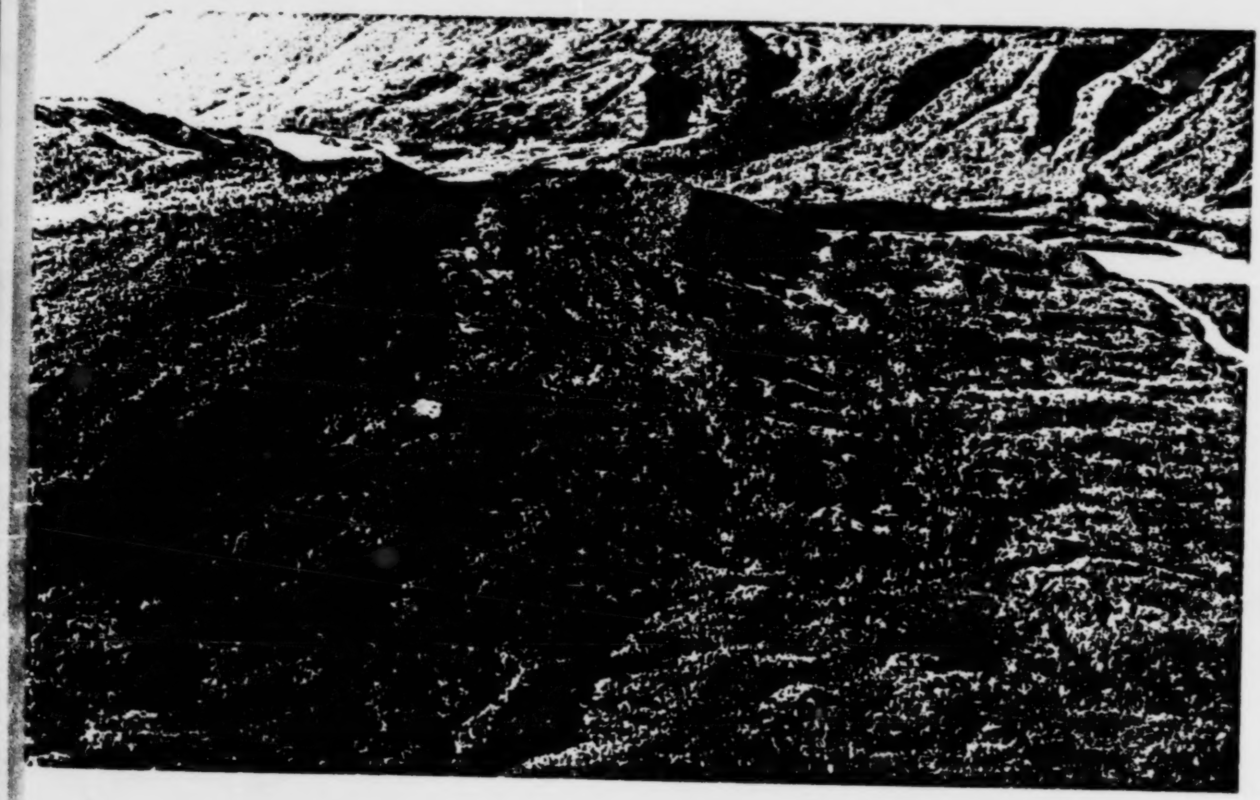

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PHOTO 2.7 - Flow Slide - This view of the right bank of the Toad River shows flow slides originating from clay/silt overburden. Some of the underlying shale may also be involved.

LEGEND

MESOZOIC

CRETACEOUS

UPPER CRETACEOUS

10	Sandstone, conglomerate, marine shale, concretions
9	*FORT NELSON FORMATION:* conglomerate, sandstone, shale

LOWER CRETACEOUS

8	*LEPINE FORMATION:* marine shale; sandstone lenses, rusty concretions
7	*SCATTER FORMATION:* sandstone, and marine shale; rusty concretions
6	*GARBUTT FORMATION:* marine shale; rusty concretions

TRIASSIC

MIDDLE TRIASSIC

5	*LIARD FORMATION:* massive beds of grey limestone and sandstone

LOWER AND MIDDLE TRIASSIC

4	*TOAD FORMATION:* sandstone, black and brown platy shales; limestone lenses
3	*GRAYLING FORMATION:* grey marine shale, lenses of ripple-marked sandstone

PALÆOZOIC

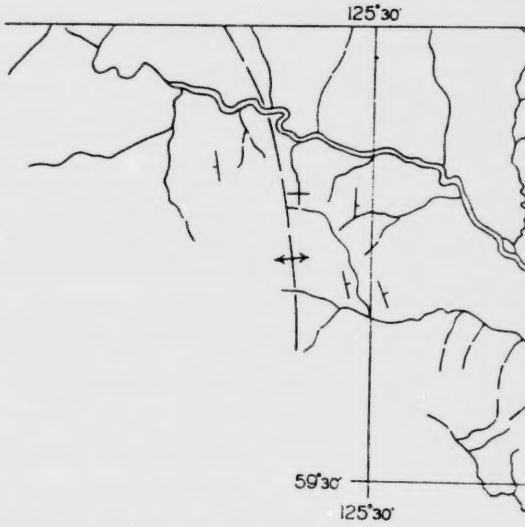
PERMIAN

2	Chert; overlying sandstone and shale (In structure-section only)

CARBONIFEROUS (?) AND PERMIAN

1	Sandstone, sandy argillite, shale, limestone (In structure-section only)

Bedding (inclined, horizontal). . . . . ⟋ +
Fault. . . . . ∿∿∿
Anticlinal axis. . . . . ↕
Escarpment. . . . . ʻʻʻʻʻ



Geology by E. D. Kindle, 1943.

Cartography by the Geological Mapping Division, 1950.

To accompany Memoir No. 259 by F. H. McLearn and E. D. Kindle.

Scale: 1 Inch to 4 Miles = $\frac{1}{253,440}$

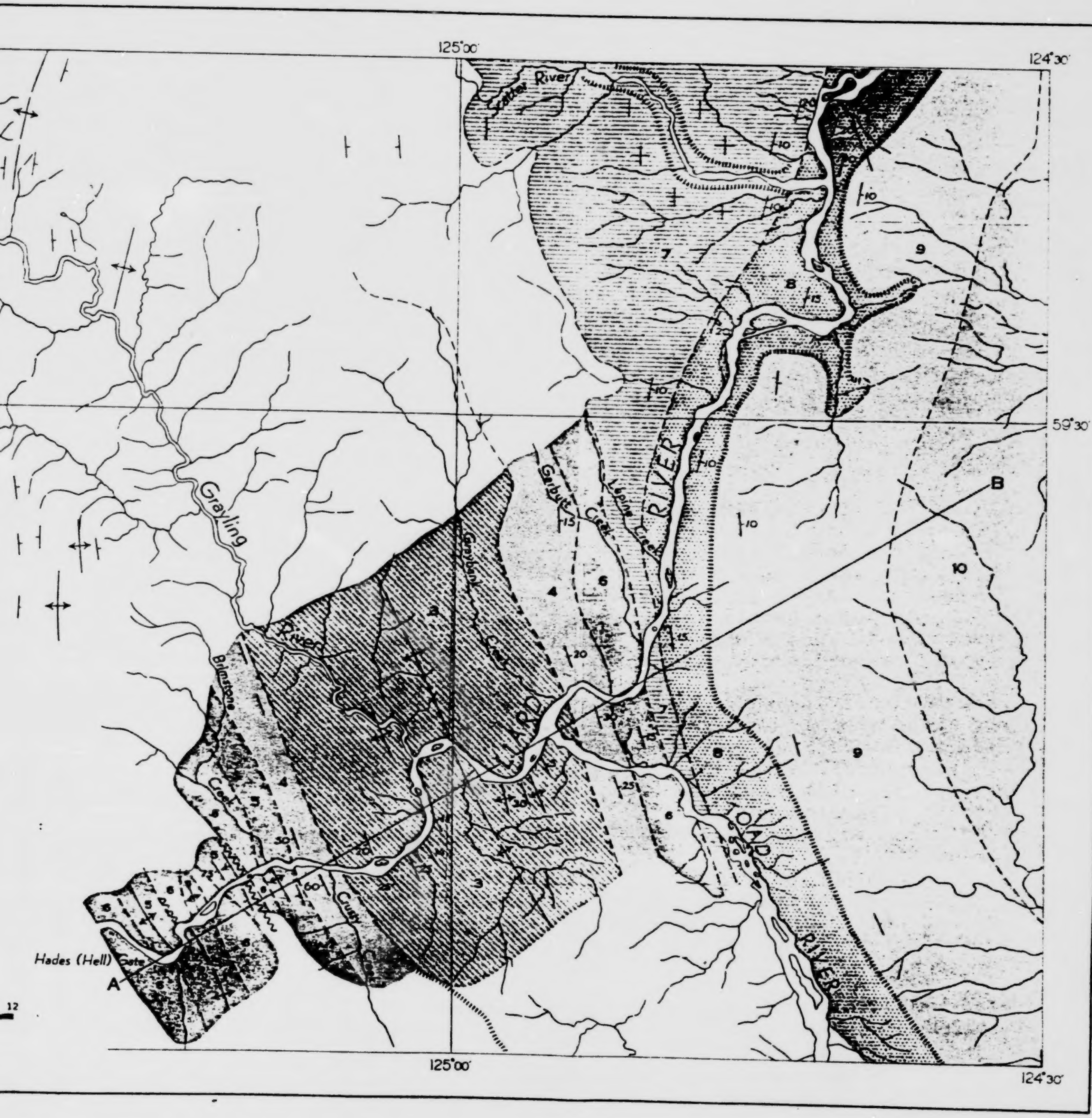
MILES

4 0 4 8

Published, 1951.

Reference:

Extracted from Figure 4, G.S.C. Memoir 259


125°00'
124°30'
59°30'
Scatter River
Grayling River
Brimstone Creek
Gerbutt Creek
Lepine Creek
Crusty Creek
LIARD RIVER
Hades (Hell) Gate
A
B
2
3
4
5
6
7
8
9
10
12

REGIONAL GEOLOGY

Hell Gate (km 565) to
Scatter River (km 495)

FIGURE 2-4

PRELIMINARY

PHOTO 2.8 - Anticlinal fold in sedimentary bedrock of the Grand Canyon of the Liard River.

PRELIMINARY

Cordilleran Ice Sheet about 14,000 years ago (Mathews, 1980). Because this is an area which lay between retreating ice sheets, the local geomorphology was greatly affected by deglacial events (discussed in later sections).

Areas of low relief organic terrain suspected to contain discontinous permafrost have been identified by the terrain mapping on portions of the Alberta Plateau.

2.5 ROCKY MOUNTAIN FOOTHILLS (NTS N/2, 3, 6, 7)

This area consists of tightly folded and faulted sedimentary rocks mostly of Triassic age (Fig. 2-3 and Taylor and Stott, 1980). The strike of these folded rocks is NW-SE and the ridged topography of the foothills strongly reflects this trend. The foothills are bounded on the west by the higher Muskwa Ranges of the Rocky Mountains and on the east by the gently dipping Mesozoic rocks of the Alberta Plateau. The Liard Plateau bounds this province to the north; the border between the two subdivisions follows the Liard River through its Grand Canyon. The distinction between the Liard Plateau and Rocky Mountain Foothills is made mostly on the basis of the northward veering structural trend and more rounded summits north of the Liard River.

Photo 2.8 shows a tight fold structure typical of the geology of the foothills and illustrates how the Liard River flows across the strike of the bedrock structures.

The foothills were inundated by Cordilleran Ice during the late Pleistocene Epoch. Several meltwater channels formed along margins of valley bottom ice in the Grand Canyon area and local deposits of ice-contact stratified drift accumulated in portions

PRELIMINARY

of the Liard Valley. The foothills are mantled with till and colluvial deposits with surface exposures of bedrock. Some foothill crests lie above treeline and are subject to alpine geomorphic processes.

2.6 ROCKY MOUNTAINS AND LIARD PLATEAU
(NTS 94 N/3, 4, 5, 6, 11, 12; 94 M/7, 8, 9, 16)

The terrain mapping for this study covers only the northernmost portion of the Rocky Mountains Province which lies south of the Liard River between the foothills and the Rabbit Plateau. At their northernmost end (bounded by the Liard River) the Rockies are distinctly subdued (see Holland, 1964, Plate 37A, and p.91). The portion of the Liard Plateau covered by the mapping shares several common characteristics with the Rocky Mountains; for convenience each of these areas is discussed under one heading.

The Rocky Mountains consist of folded and faulted Paleozoic and Mesozoic sedimentary and metamorphic rocks. Most of the rocks in the study area are sedimentary with carbonate rocks dominating the western portion of the area (Photo 2.9).

The terrain in this portion of the Rockies is hilly to mountainous but many peaks are forested; alpine glaciers and related features occur only in the higher ranges further south. The Rabbit Plateau is an extension of this portion of the Rockies and is a transitional area comprising lower glaciated hills. Most of the terrain in the Rocky Mountains consists of bedrock, colluvium and till.

The Liard Plateau lies north of the Liard River. The bedrock here consists of folded and faulted sedimentary rocks which strike more northward than in

PRELIMINARY

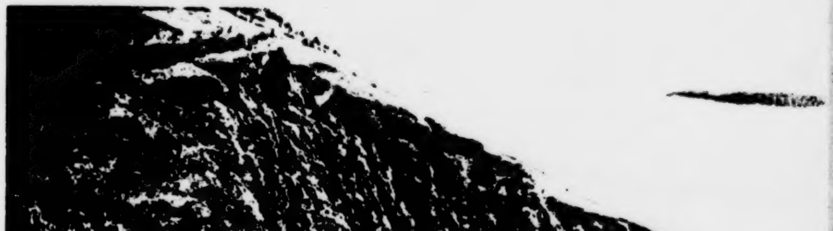
PHOTO 2.9 - Rocky Mountains - View looking downstream along the Liard River from km 649. The Alaska Highway is visible on the left side of the photo. The mountains in the background are formed of karstic limestone.

PRELIMINARY

PHOTO 2.10 - Liard Plateau - This view is taken looking upstream over the Alaska Highway bridge crossing over the Liard River near the Hot Springs Provincial Park. The terrain on the north side of the river is subdued relative to the mountains on the south side.

PRELIMINARY

PHOTO 2.11 - Bedrock landslide on the north side of the Liard River near the Lower Liard crossing of the Alaska Highway. View northward.



PRELIMINARY

PHOTO 2.12 - Liard Plateau - This view is taken of Site E looking east across the Liard River towards the Liard Plateau. This is the beginning of the Grand Canyon which extends downstream for about 50 km. The low vertical rock walls visible in the photo persist throughout the Canyon.

the Rockies. Carbonate rocks, some of which display evidence of karst features, occur in the western portion of the area. The terrain is hilly (Photo 2.10) to mountainous; areas of resistant carbonate rocks have several prominent mountain peaks. The bedrock structures and terrain on the east side of the plateau are comparable to, and transitional with, the Alberta Plateau. Much of the terrain on the Liard Plateau is formed by bedrock, colluvium and till. Evidence of permafrost was noted in the uppermost Grayling River area. Frozen ground was reported in the lower Trout River area (Cobb, 1981) and is suspected elsewhere (see Section 2.11). Small landslides have occurred at scattered locations both north and south of the Liard River. One bedrock slide is situated above the Liard River east of Lower Liard highway crossing (Photo 2.11).

One low relief portion of the Liard Plateau north of the Grand Canyon is mantled with extensive deposits of ice-contact stratified drift. Evidence for eastward flowing ice and meltwater is noted at several locations. Mathews (1980) shows that Cordilleran Ice extended to the eastern limits of the Liard Plateau.

These two areas comprise the highest relief portions of the study area. Notably the Liard River has incised its course through the Rockies and the Liard Plateau from areas of lower relief to the west. A major knickpoint in the river profile occurs in the area of Devils Gorge (Photo 2.12) above the Grand Canyon.

Terrain-related features of these areas include several hot springs north of the Liard River. Well known hot springs occur in the Provincial Park near Lower Liard crossing and along the Deer River. The deeply incised gorges of the upper Scatter River and the Grand Canyon of the Liard are of considerable interest.

2.7 RABBIT PLATEAU (93 M/3, 4, 5, 6, 7)

The Rabbit Plateau is geologically related to and considered a transitional sub-province of the Rocky Mountains by Holland (1964). The plateau is underlain by northwesterly plunging folded sedimentary rocks of Paleozoic and pre-Paleozoic age. The area is drained by the Rabbit and Vents Rivers and consists primarily of low wooded ridges.

The Rabbit Plateau is bounded on the west by the Rocky Mountain Trench and west to north by the till covered surfaces of the Liard Plain. Cordilleran Ice covered the plateau and ice flow indicators are oriented north to east. Ice tongues issuing from the Cordillera and the Rocky Mountain Trench stagnated in several valleys such as that containing Graveyard Lake (at the north limit of the Rabbit Plateau) and Sick Wife Creek. These valleys are now filled with ice-contact stratified drift and contain underfit streams.

The terrain on the Rabbit Plateau is covered by till with lesser amounts of outwash materials, colluvium and bedrock.

2.8 LIARD PLAIN
(NTS 94M/5, 6, 7, 10, 11, 12, 13, 14, 15, 16;
95/D2, 3, 4; 104 P/9, 10, 14, 15, 16;
105 A/1, 2, 3)

This physiographic subdivision comprises nearly one half of the study area. It is bounded on the south by the Rocky Mountains, on the east by the Liard Plateau, on the north by the Hyland Plateau, and on the west by the Cassiar Ranges including the Kechika Ranges and Dease Plateau (Holland, 1964).

This is an area of low to moderate relief surrounded on all sides by higher terrain. The bedrock geology of the area is comparatively little known due in part to the extensive cover of glacial drift (see Gabrielse, 1962, 1963 and 1966). The entire area was covered by the Cordilleran Ice Sheet; till is a very common surface material and diverse landforms give evidence for processes of glacial erosion and deposition. As ice moved across the plain in a east to northeast direction, bedrock and till were formed into numerous drumlins and other ice streamlined features. Small meltwater channels are common everywhere and some exceedingly large meltwater drainageways have eroded into bedrock north of the Liard River in the area of the Coal and Smith Rivers. South of the Liard, ice stagnated in the valleys of Gemini Lakes and Fishing Creeks. Numerous muskegs also exist across the Liard Plain and frozen ground has been observed in the Smith River Valley (see Section 2.11). Also noteworthy are the extensive areas of ice-contact stratified drift in the form of eskers, kames and kame terraces which occur in the area of the Smith River Military Reserve, the lower Coal River and the immense area of deposits adjacent to the Liard along the B.C.-Yukon border from Barney Lake to the area of Watson Lake. Some stagnant ice features, such as ice-crevasse fillings, are remarkably preserved in the latter area. Some eskers, such as the feature issuing from the Red River area west of the Kechika, are exceptionally long.

Some of the greatest relief in the Liard Plain is found where the Liard River is incised into till mantled upland surfaces. Photo 2.13 shows the Liard in a canyon sector between Irons Creek and Fireside. The river gradient steepens over bedrock between Fireside and the Coal River (see Fig. 2.2) and several other areas of bedrock occur in the riverbed at points upstream. In the Hyland River area the Liard flows in a wide valley with many large river terraces (Photo 2.14). Some of these terraces are mantled with stabilized sand dunes. Landslides have occurred along the Liard River in the Yukon (Photo 2.15); some of these have involved late Tertiary volcanic rocks. Other landslides are known at scattered locations.

2.9 ROCKY MOUNTAIN TRENCH (NTS 93 M/3 and 4)

The trench is a structurally controlled feature filled with extensive outwash which often covers glacial lake sediments. Areas of till covered shallow bedrock also occur on the trench floor. The trench consists of a wide, low relief valley bounded on the east by the Rabbit Plateau and on the west by the Kechika Ranges. The trench was inundated by Cordilleran glacier ice which flowed northward.

This study encompasses only the northernmost portion of the Rocky Mountain Trench where it merges with the Liard Plain. The trench is well defined south of the confluence of the Turnagain and Kechika Rivers. From here, the west wall of the trench remains well defined to the northwest as far as the Red River. The north end of the trench is structurally connected to the Tintina Trench in the Yukon by the Tintina Fault whose trace is buried by the extensive drift in the intervening area of the Liard Plain (Gabrielse pers. comm. 1980). Tempelman-Kluit (1980) gives evidence that the Tintina Trench is of recent (Pliocene) geologic age and his work relates to the drainage evolution of the Liard River (see later section).

One remarkable terrain feature in the Rocky Mountain Trench is an active parabolic sand dune located just south of the Turnagain River.

PRELIMINARY

PHOTO 2.13 - The Liard River in a canyon sector between Irons Creek and Fireside. The river is entrenched in bedrock and the level upper surface is covered with extensive drumlins. View westward.

PHOTO 2.14 - The wide alluvial valley of the Liard River between the Hyland River and Watson Lake. View northwestward.

PHOTO 2.15 - Landslide on the left bank of the Liard River to the west of Watson Lake. This is part of an extensive slide area along the river north of the upper crossing of the Alaska Highway. River erosion is implicated in these slides; some have involved volcanic rocks interbedded with Tertiary and Quaternary sediments (Klassen, 1978).

2.10 KECHIKA RANGES (94 M/4)

The study area includes a small portion of these ranges (a sub-province of the Cassiar Mountains) in the area of the Turnagain River. The prominent peaks are formed of folded Pre-Cambrian and Paleozoic sedimentary rocks. Resistant carbonate rocks occur in the area mapped by this study. A few of the sharp, prominent peaks in the study area may have projected above the surface of the Cordilleran Ice Sheet. Colluvium and bedrock are the major surface units with small eskers and other glacial landforms noted in some valleys. The Turnagain and Red Rivers apparently carried large amounts of meltwater and outwash from the Cassiar Mountains during late stages of deglaciation.

2.11 PERMAFROST

The study area lies within zones of scattered and widespread discontinuous permafrost (National Research Council of Canada, 1981, p. 32). The distribution of permafrost is dependent on factors of insolation, snow cover, soil and rock type, hydrology, vegetation and forest fire history. It is difficult to locate discontinuous permafrost by air photo studies only. Field evidence includes area of "drunken" forest on level ground, thaw ponds, patterned ground, and certain types of landslides. Notably all of these conditions (except patterned ground) give evidence for the localized warming of the thermal environment which supports permafrost. Systematic probing, drilling and sampling are the only means of proving the extent and depth of permafrost. Discontinuous permafrost can be expected on north and east facing slopes, high altitudes, in organic terrain such as muskegs and in fine grained (silt and clay) sediments with or without an insulating cover of organic soils (National Research Council of Canada, 1981).

"Skin" flow landslides (NRC, 1981, p. 31-72) are noted at some locations in the study area. Serveral slides in the Liard Plateau region are judged to have been caused by the thawing of the local permafrost; a severe and very extensive forest fire in 1971 may be the indirect cause of these slides.

Typically the skin slides begin on shallow to moderate slopes (15° to 25°) and involve fine grained soils which may become very mobile; the slides often run out as flows for considerable distances. Many small, shallow flows and slumps, almost certainly related to the degradation of permafrost, were observed in the northern Smith River valley and a slide on a north slope in the Dease River valley is suspected to be permafrost related.

Frozen earth materials including silty gravels as well as silts and clays were reported at the B.C. Hydro bridge construction site on the lower Trout River by Mr. William Cobb (Construction Supervisor for B.C. Hydro - June, 1981). Members of the construction crew at the site attributed the instability of cut gravel slopes on the Site E camp access road to be due to the thawing of frozen soil horizons. Mr. Cobb is of the opinion that the frozen materials he encountered in early to mid-June would probably have melted by the end of the summer season. Crystalline vein ice was found in clay at the head of a failing slope east of the Smith River Airfield by Gerath and MacLean in mid-June, 1981. The ice was encountered 40 cm beneath the ground surface. Approximately 20 cm of fibric organic soil lay at the surface and the pre-slide, north facing slope was inclined at about 15° from the horizontal. Drunken trees indicating thawing ground are noted at several locations in the study area; a large area is situated in a muskeg west of the Vents River south of km 650 on the Liard. Discontinuous permafrost is inferred in many areas of the Alberta Plateau. Observations of frozen ground or areas of inferred permafrost are shown on the terrain maps in Appendix A.

Discontinuous permafrost should be expected at locations with favorable aspect, altitude and in areas of organic and fine grained soils throughout the study area. Much further investigation is required to refine knowledge of the distribution and depths of permafrost. The determination of local permafrost conditions may be important to issues of local reservior shoreline stability, as well as the design of roads and other engineering works in the area.

2.12 GEOMORPHIC DEVELOPMENT OF THE UPPER LIARD BASIN

The Liard River has eroded its course across folded and faulted sedimentary rocks in the topographic barrier formed by the Rocky Mountains, Liard Plateau and Rocky Mountain Foothills to join the great consequent stream system of the McKenzie River. The age of the upper Liard River basin is an interesting geomorphic issue. Glacial erosion and deposition features show that Cordilleran Ice and glacial meltwater escaped eastward in the Liard River valley; the present course of the river is therefore older than the last Pleistocene continental glaciation.

Holland (1964, p.108) notes: "The headwaters of the Liard River, upstream from the confluence of the Kechika, are on the western side of the Rocky Mountains and the Liard Plateau. The course of the river was established before the uplift of the mountains. Its position was maintained during mountain building in the Paleocene and again during the re-elevation of the region during the Pliocene." Thus Holland suggests the Liard River has been superposed across the Rocky Mountains since Paleocene time (65 to 70 million years ago).

The Rocky Mountain Trench (north of Sifton Pass) is a headwaters area of the Liard River. Tempelman-Kluit (1980) marshalls geologic and geomorphic evidence to show that the geologically related Tintina Trench in the Yukon is a late Tertiary (probably Pliocene) graben which is superposed on the surrounding physiographic surface. Notably, large valleys that slope toward the Tintina Trench are truncated but can be matched on the opposite side of the trench.

Within the study area, the valley of the Turnagain River is truncated by the Rocky Mountain Trench but can be matched across the Kechika River to the drift-filled and more poorly defined valley containing Boya Creek and Graveyard Lake. The east end of this valley connects with the northward flowing Rabbit River. This geomorphic observation indicates that the Turnagain may have flowed into the Rabbit River prior to the subsidence of this portion of the Rocky Mountain Trench in Pliocene Time (an idea by Gerath given support by pers. comm. with D. Tempelman-Kluit, 1981). Thus the Liard River developed its upper drainage area beyond the Rocky Mountains over 7 million years ago.

PRELIMINARY

Chapter 2 PHYSIOGRAPHIC DESCRIPTION

The youthful character and unique magnitude of landsliding in the Liard Valley between the Beavercrow dam site and the Toad River suggests this sector of river is of comparatively recent (perhaps interglacial) age. It may be that meltwater erosion in this ice-sheet boundary area cut the valley across a drainage divide which diverted the earlier Liard to the Fort Nelson Lowlands via the Toad-Dunedin River systems.

PRELIMINARY

Chapter 3

LATE PLEISTOCENE GLACIAL HISTORY

The evidence for glacial events in the Pleistocene Epoch is largely restricted to observations which relate to the final stages of glaciation and the ultimate deglaciation of the region. Two continental ice sheets coalesced at the boundary between the Alberta and Liard Plateaus*. The Laurentide Ice Sheet, with source areas over the Keewatin Peninsula and Hudson Bay, and the Cordilleran Ice Sheet, with source areas in mountains west of the Rocky Mountain Trench, began to dissipate and retreat about 13,500 years before present (based on radiocarbon dating, Mathaws, 1980).

The earliest Quaternary geologic history of the region is largely a matter of speculation because of the effects of glacial erosion over complex terrain and the lack of measured stratigraphic sections. Nonetheless, exposures with possible Tertiary sediments capped by Quaternary units including lava flows (see Photo 2.15) and four separate till units have been documented by Klassen (1978) on the banks of the Liard River near Watson Lake. These exposures offer a unique continental record of geologic and climatic events spanning the last 2 to 3 million years

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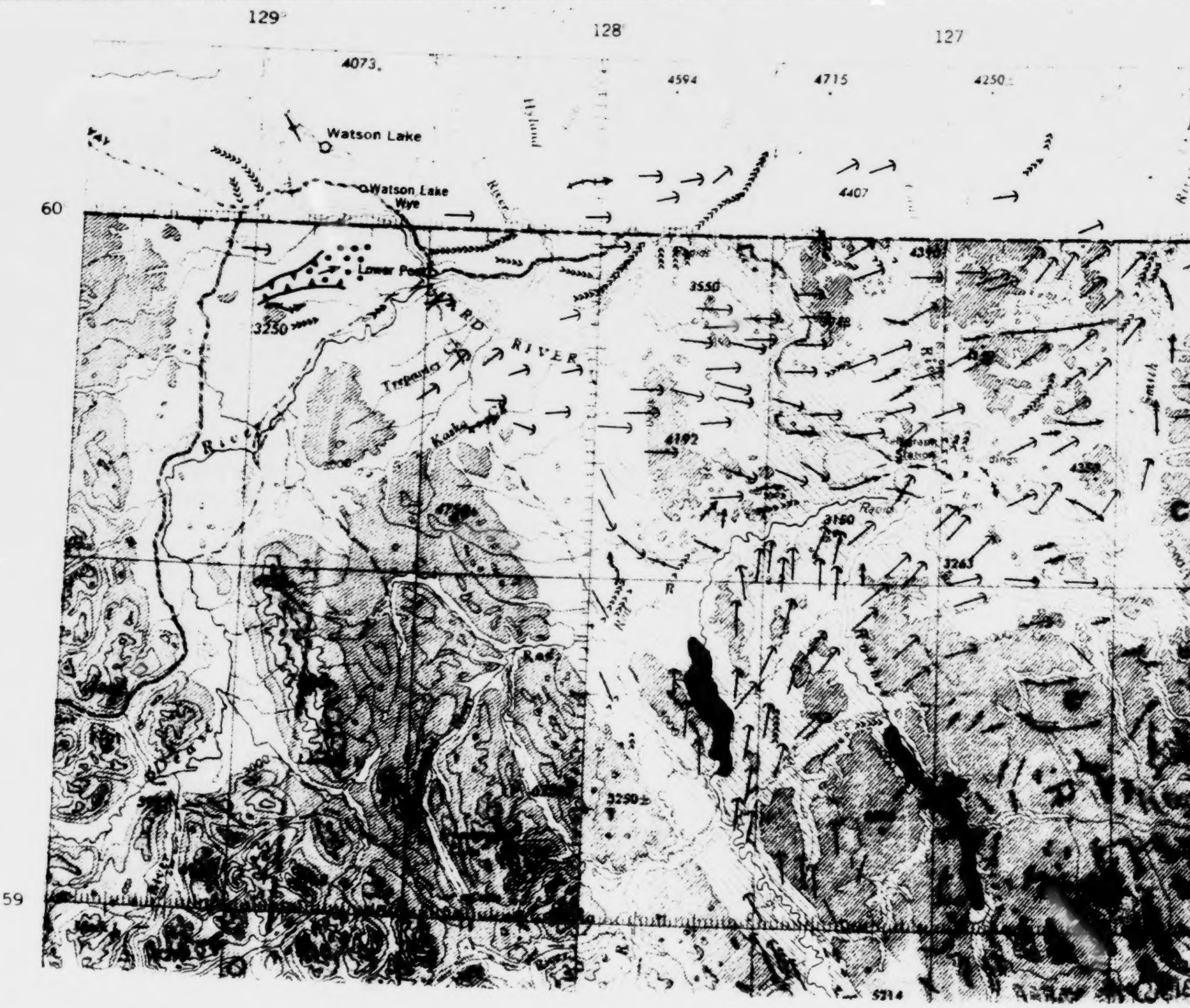
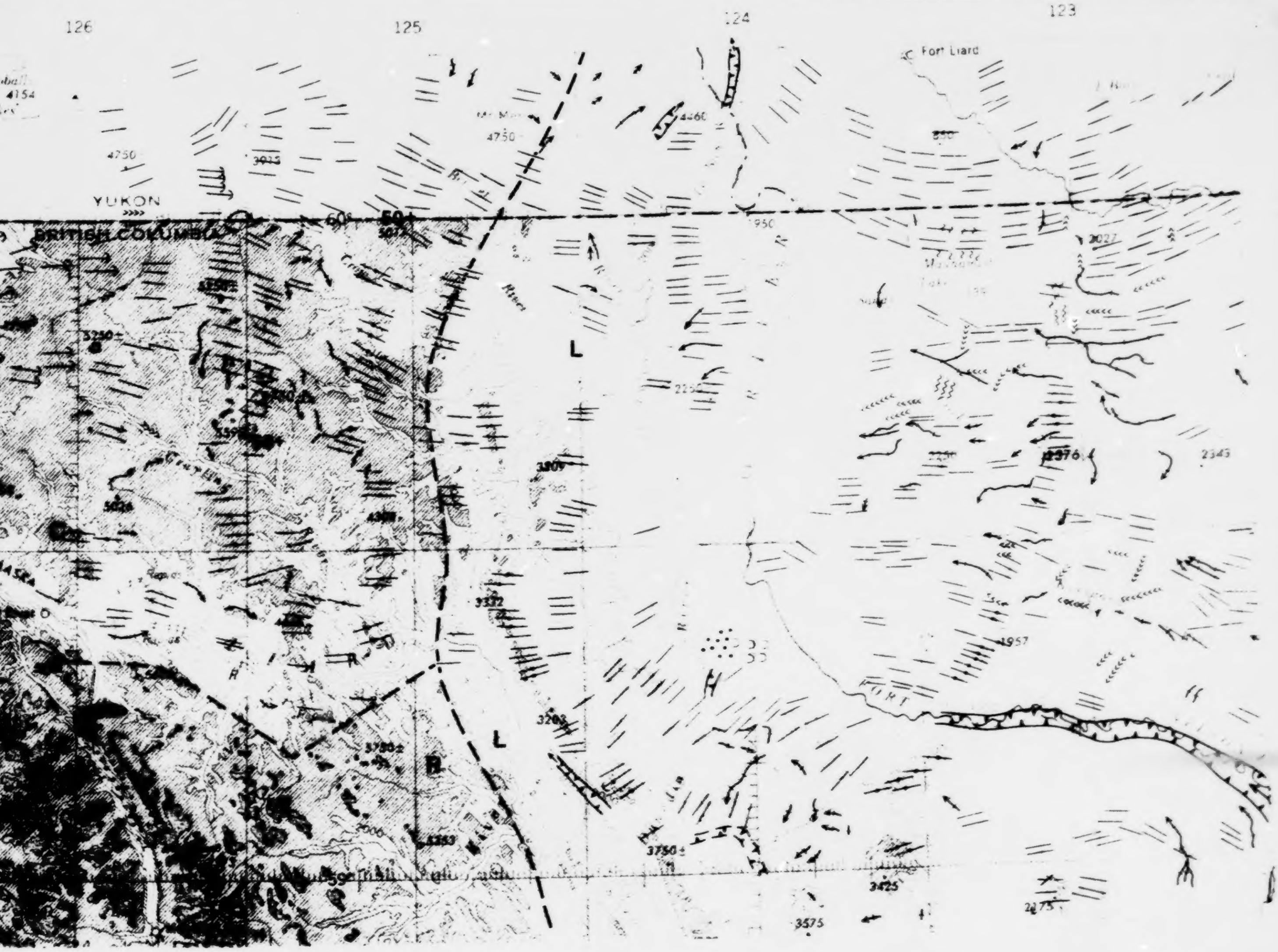
*Mathews (1980) shows a Rocky Mountain Glacier system in the southern portion of the study area. This was apparently formed by a system of coalescent valley glaciers issuing from the northern Rocky Mountains. Rocky Mountain till is distinguished on the basis of lithology from Cordilleran till. For purposes of discussion in this report the Rocky Mountain and Cordilleran glacier systems are treated as one and the same.


129
128
127
60
59
4073
4594
4715
4250
4407
Watson Lake
Watson Lake Wye
Lower Post
Hyland River
LIARD RIVER
Trepanier
Kechika
3250
3550
4192
3150
3263
3250±
4350
5214
Rapids
Smith
R
C

LEGEND

Erratics	
Laurentide provenance	**L**
Rocky Mountain provenance	**R**
Cordilleran provenance	**C**
Boundary between drifts of different provenance	— — — —
Glacial grooves and drumlinoids in drift (ice flow direction known, unknown)	↗ /
Glacial grooves and drumlinoids in rock (ice flow direction known, unknown)	↗ /
Abandoned channel (flow direction indicated where known)	→
Ill defined channel (from penultimate glaciation?)	
Esker	‹‹‹‹‹‹‹‹‹‹‹‹
Ice-thrust ridges and ridges of uncertain origin	〰
Ice-dammed lake and glaciolacustrine sediments	▬
Outwash plains of sand and gravel	· · · · ·
Area of parabolic dunes with orientation	⊃ ⊃ ⊃ ⊃ ⊃ ⊃
Radiocarbon date	25 940 ± 380 GSC-573
High-level record of glaciation (erratics, meltwater channel, or glacial groove, elevation in feet x 100)	**50**


126
125
124
123
Fort Liard
4154
4750
3915
YUKON
BRITISH COLUMBIA
60°
5077
4460
4750
1950
2022
3250
L
2250
3309
2376
2343
4300
3332
1957
3293
L
3750
3753
3750
3425
3575
2275

Most of the glacial features shown on this map are from Geological Survey of Canada Bulletin 331 by W.H. Mathews (1980). Glacial features in B.C. west of longitude 128° and in the Yukon west of longitude 126° 30' are plotted from this (1981) study by Thurber Consultants Ltd.

PRELIMINARY

GLACIAL MAP OF THE LIARD RIVER
STUDY AREA

FIGURE 3-1

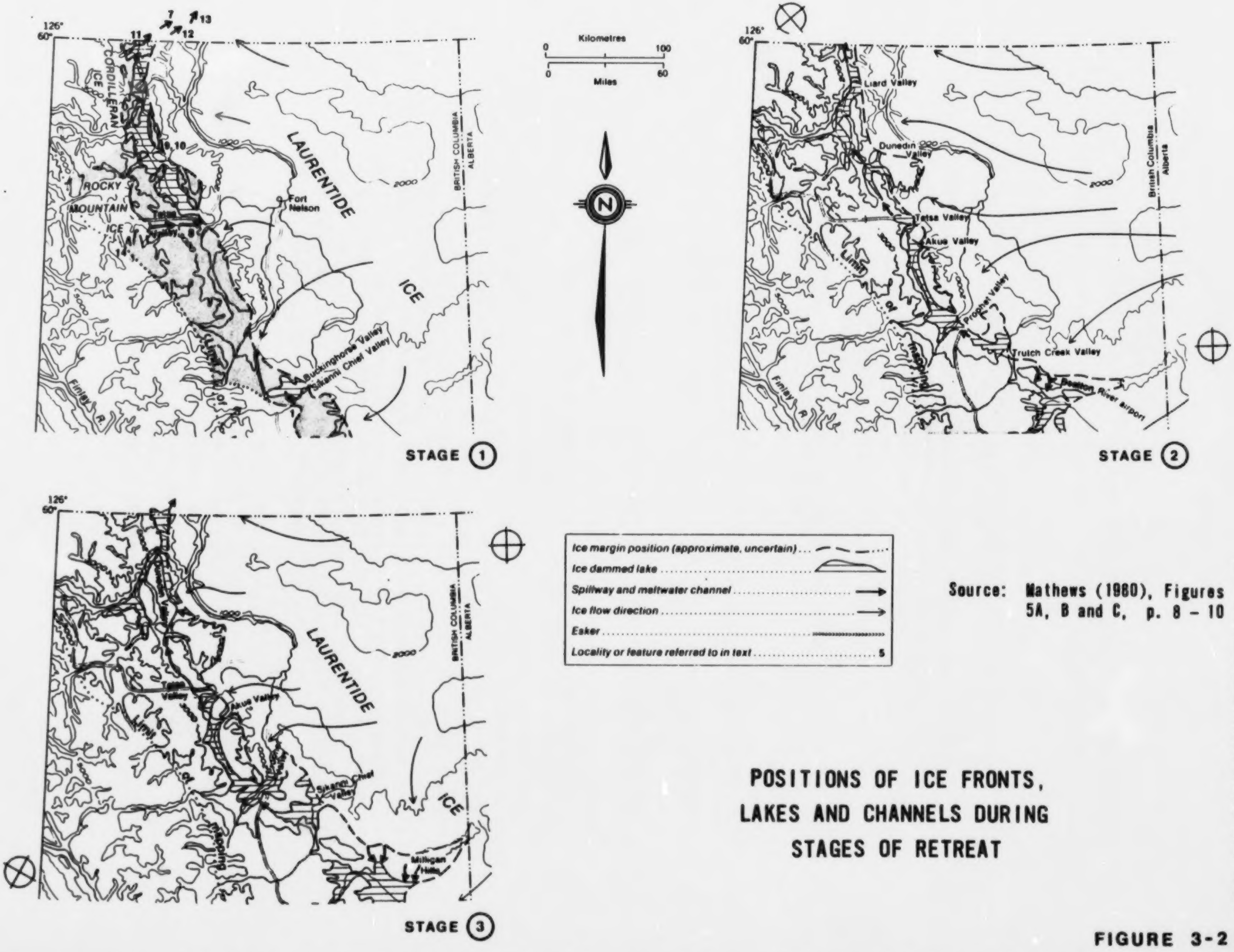
and deserve further study with applications in geology and North American archaeology. These exposures indicate that the study area was glaciated four times during the Pleistocene Epoch. Although the Liard River probably nearly followed its present course prior to the onset of the Quaternary glaciations (see Section 2.10) glacial erosion and deposition modified the regional terrain.

3.1 THE LAURENTIDE ICE SHEET

Fig. 3-1 shows the approximate boundary area between the Laurentide and Cordilleran Ice Sheets in the eastern portion of the study area (from Mathews, 1980). Ice flow indicators and till lithologies show the Laurentide Ice Sheet extended beyond the Liard River to the boundary of the Liard Plateau. During the glacial maximum, the two continental ice sheets apparently merged.

It is probable that the Laurentide ice front persisted in the Liard Valley north of the Toad River as Cordilleran Ice retreated westward. Glacial lakes were dammed here by Laurentide ice and the prominent ridges which bound the lowlands to the east. Fig. 3-2 shows the generalized locations of these lakes at several stages of deglaciation. Meltwater spillways were situated to the north of the study area near the Yukon border. These lakes ranged in elevation from 520 m (1700 ft), when ice persisted in the area of Site A (Mathews, 1980, p.10 and 15), to less than 1500 ft (460 m) as the Laurentide ice front retreated eastward across the Alberta Plateau lowlands.

The glacial lakes in this area were fed by drainage from two ice sheets. Meltwater drainage issuing from the Liard Plateau probably accounts for the deep incision of the Scatter River and Chimney Creek. A meltwater channel system formed in the Toad Valley from Laurentide ice drainage; the contrast in


126°
60°
7
13
11
12
CORDILLERAN ICE
ROCKY MOUNTAIN ICE
9, 10
Tetsa Valley
8
LAURENTIDE
Fort Nelson
ICE
Limit of
Buckinghorse Valley
Sikanni Chief Valley
Finlay R.
2000
5000
BRITISH COLUMBIA
ALBERTA
STAGE ①
Kilometres
0
100
0
60
Miles
N
Liard Valley
Dunedin Valley
Tetsa Valley
Akue Valley
Prophet Valley
Limit of mapping
Trutch Creek Valley
Beatton River airport
British Columbia
Alberta
STAGE ②
Akue Valley
Sikanni Chief Valley
Milligan Hills
STAGE ③
Ice margin position (approximate, uncertain)
Ice dammed lake
Spillway and meltwater channel
Ice flow direction
Esker
Locality or feature referred to in text
5

Source: Mathews (1980), Figures 5A, B and C, p. 8 - 10

POSITIONS OF ICE FRONTS,
LAKES AND CHANNELS DURING
STAGES OF RETREAT

PRELIMINARY

FIGURE 3-2

drainage patterns between Torpid Creek and nearby consequent streams indicates that Torpid Creek was incised along the front of the Laurentide Ice Sheet.

Colluvium, till, glacial lake deposits, recent alluvium and organic soils are the dominant surface materials which remain in the area once covered by the Laurentide Ice Sheet. The spectacular array of colluvial landforms in the Liard, Scatter and Toad River valleys is a consequence of the extensive mantle of slide-prone, fine grained drift and the available relief for deep-seated rock slides which has been created by meltwater and more recent fluvial erosion.

3.2 THE CORDILLERAN ICE SHEET

Cordilleran ice covered most of the area mapped by this study; the discussion which follows is referenced to Fig. 3.1. Glacially streamlined till landforms such as drumlins and crags-and-tails show that Cordilleran ice flowed generally eastward across the region. Glacial ice issuing from the Rocky Mountain Trench and Rabbit Plateau veered northeastward from source areas to the south. As glacier ice thinned, its flow became more confined by local topographic features and late stage flow indicators are likely to deviate from the pattern of the earlier regional ice flow. Crossed ice-flow indicators are mapped in the area of Lower Post (Sheet 104 P/16) where late flow became concentrated in the Dease River valley and crossed drumlins shaped by the thicker ice.

There is widespread evidence for the stagnation of Cordilleran Ice in the main valleys of the study area. Accumulations of stratified drift are often situated at the downstream ends of valleys such as that of an unnamed creek south of the Liard Grand Canyon which carried meltwater from a glacial lake in the area of Muncho Lake (see Mathews, 1980, p.11 and

Fig. 3.1). Several meltwater channels such as the Shaw Creek system (94 M/15) are deeply cut into bedrock and were probably formed during several glacial periods while ice blocked other avenues of meltwater discharge in the Liard Valley.

Ice stagnation features in the form of eskers, kame terraces, kames and kettled outwash plains are sometimes very extensive. Examples of these sorts of features are found north of the Liard Grand Canyon, in portions of the Smith River Valley, in the lower Coal River Valley and several areas in and around the Rocky Mountain Trench. Worthy of special note are large areas of ice-stagnation features which extend from north of the Liard River near Contact Creek to east of Lower Post and Watson Lake. Several large eskers are found here including one which lies along Esker Lake and continues to the Coal River (94 M/14). Some rectilinear fluvioglacial features in this area preserve fine details of the crevasse patterns in the ancient glacier ice.

The meltwater and sediment sources for these large areas of ice-contact stratified drift lay to the west in the Dease Valley and Cassiar Mountains. Outwash from the west apparently inundated large tracts of ice which had thinned and stagnated in this very low-relief portion of the Liard Plain.

Some areas of stabilized sand dunes occur on outwash surfaces between Watson Lake and the Hyland River. These deposits probably formed before the outwash was vegetated in immediate postglacial time or after forest fires. A large active parabolic sand dune is found south of the Turnagain River (above the proposed Devil's Gorge pondage) in the Rocky Mountain Trench.

The extent of glacial lake sediments is largely unknown in the area covered by Cordilleran Ice. These deposits are commonly capped by outwash gravels in the

Rocky Mountain Trench and portions of the Smith River Valley.

Since the deglaciation, fluvial processes have become dominant across the area. Large amounts of glacial sediments were reworked and redeposited in immediate post-glacial time and continue to be reworked as streams adjust their gradients to present runoff, sedimentation conditions and bedrock base level controls.

Chapter 4

TERRAIN FEATURES OF SPECIAL INTEREST

Item 5 of the terms of reference for this study (Page 2) requires a description of landforms which, because of their number, size, scarcity or state of preservation, make them unusual and of particular value as recreational resources. The following sections describe landforms or areas of landforms of special interest under headings classified by the genetic materials of the terrain mapping system. Some features will suffer inundation or other adverse impacts from hydroelectric developments on the Liard. An earlier study by Thurber Consultants Ltd. (1980) evalutes the effects of the proposed reservoirs on shoreline stability. Fig. 4-1 shows alternative reservoir proposals currently being considered by B.C. Hydro.

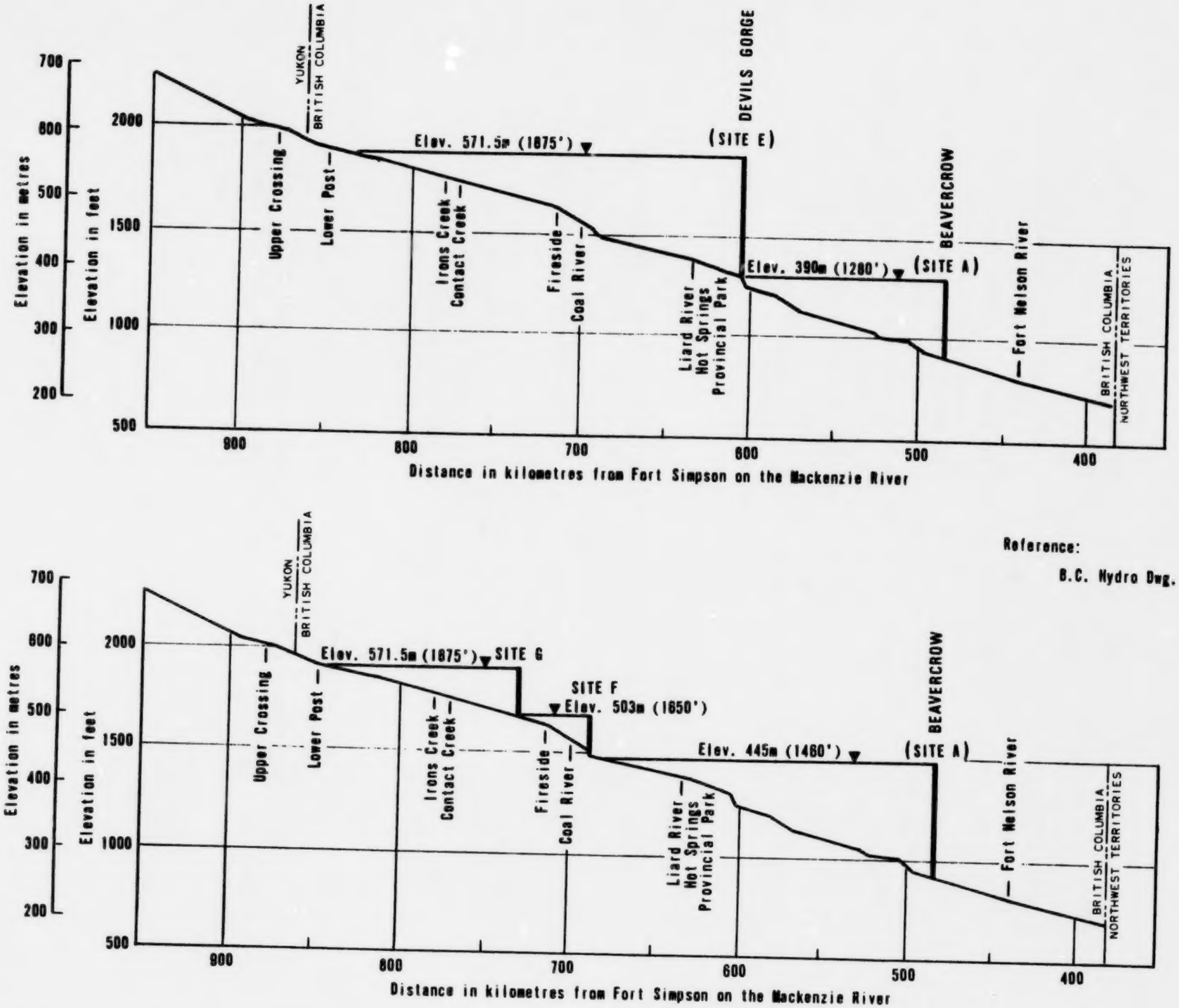
4.1 ANTHROPOGENIC FEATURES

Man-made or man-modified features are mapped by this study only in the area of the Watson Lake Airfield because of the lack of human activity except along the Alaska Highway. The archaeological history of the area is of great interest in view of the possibility that the separation of the Laurentide and Cordilleran Ice Sheets provided an ice-free path of migration for early man in North America (Mathews, 1980, p.21). Archaeological studies in the region may provide evidence of ancient anthropogenic materials.

4.2 COLLUVIAL FEATURES

The valleys of the Liard and Toad Rivers on the Alberta Plateau as well as tributaries such as Chimney

PRELIMINARY



Reference:

B.C. Hydro Dwg. No. 1101-C14-8157

ALTERNATIVE LIARD RIVER RESERVOIR PROPOSALS

FIGURE 4-1

Creek and the Scatter River deserve special recognition because of the spectacular array of bedrock and overburden landslides found there. These landslides often owe their form and extent to local bedrock geologic conditions which are also well displayed. This area may deserve consideration as a Provincial Park because of these and other features such as the gorge of the upper Scatter River. Public access to this remote area would be facilitated by the development of the Beavercrow reservoir system.

Landslides along the east bank of the Liard near Watson Lake area are also of special interest because river erosion and sliding have revealed the important stratigraphic sections mentioned in Section 3.0.

4.3 EOLIAN FEATURES

Surface deposits of windblown sand occur in areas of extensive sand and gravel outwash. Most of these deposits are now stabilized by vegetation. The Alaska Highway crosses an area of sand dunes near Mi 610 west of the Hyland River. Descriptive road signs or public displays would make the public aware of these unusual features.

The large parabolic dune in the Rocky Mountain Trench south of the Turnagain River is advancing northward over coniferous forest; its size and state of activity make it a highly unusual terrain feature.

4.4 FLUVIAL FEATURES

Within the area there are many fluvial erosion features (canyons, falls) and deposition features such as fluvial terraces and fans. Deposition features are formed of stratified sand, gravel and lesser silt and clay. The terraces on the north side of the Liard

River around the lower Hyland River are very wide and accessible. Descriptive road signs or public displays would bring these important terrain features (and others nearby) to public attention.

The great alluvial fans of the Scatter River and Chimney Creek are formed of very coarse clastic materials issuing from the landslide filled upper valleys. Fan deposition here is reflected in the longitudinal profile of the Liard River (see Fig. 2-2). Although these features will be flooded by the proposed Beavercrow Reservoir schemes they deserve recognition as excellent examples of alluvial fans.

A major impact of the proposed reservoir systems will be the inundation of unique reaches of the Liard River and its tributaries.

The low Beavercrow system (see Fig. 4-1) will back water up to the Devil's Gorge dam site and will form a narrow strip of ponded water confined within the Grand Canyon of the Liard upstream from km 580 near Sulphur Creek (Sheet 94 N/5). This pondage scheme will flood much of the cliffed canyon walls and will eliminate the wild, turbulent flow of the river. The high Beavercrow pondage scheme will completely inundate the Grand Canyon of the Liard to well above the deep pool at the foot of Devil's Gorge.

With a dam built at Devil's Gorge, reservoir pondage will flood the falls at the mouth of the Smith River but will also create an interesting island complex in the immediate area (see Sheet 94 M/9). A Devil's Gorge reservoir will also partially inundate the canyon of the Coal River with another island complex at the river's mouth (Sheet 94 M/10). A Site F dam will have less severe flooding effects in the Coal River area; Site F pondage will not extend into the Coal River Canyon.

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Site G pondage will have the same net effects as the Devil's Gorge Reservoir option in flooding the upper portion of the canyon where the Liard has incised its course across the Liard Plain. Seasonal drawdown of the Devil's Gorge and Site G Reservoir systems will create beaching effects with adverse aesthetic characteristics including the likelihood of much windblown sand. Base level effects on the fluvial systems of each tributary to the proposed reservoir systems will require special hydrologic studies to evaluate expected changes in stream erosion and sedimentation patterns.

4.5 FLUVIOGLACIAL FEATURES

The Liard Plain is notable for its large areas of glacial outwash including features such as eskers, kames, kame terraces and crevasse fillings. These are variably stratified deposits formed of sand and gravel with lesser amounts of silt; all were emplaced in near proximity to stagnating glacial ice.

A variety of fluvioglacial features are located adjacent to the Alaska Highway from Mi 575 to Mi 606 at the Hyland River and beyond to Lower Post and Watson Lake. Outstanding examples of eskers, kettled outwash plains and kames are found in this area. Ice-crevasse fillings and kettled outwash are preserved in fine detail west of Barney Lake near Mi 581 of the Alaska Highway. Between Barney Lake and the Coal River is the esker system which begins at Esker Lake. The esker which bounds the east side of Esker Lake is more than 45 m (150 ft) high and serves as an excellent example of how meltwater systems in stagnating glacial ice were controlled by topographic features. This feature and many others adjacent to the Alaska Highway nearby deserve recognition with interpretive signs and displays.

Other noteworthy areas of fluvioglacial features are found near the lower Coal River, the Hyland River in the area of Blind Lake (Yukon Territory), in the area of the Smith River Military Reserve, and in the Red River area west of the Kechika River (94 M/5 and M/12).

4.6 MORAINAL FEATURES

Till landforms are very common in the study area. Till is generally composed of a dense mixture of materials including gravel to boulders in a variable silt, sand and clay matrix. Most glacially streamlined features such as drumlins and crags-and-tails have subdued relief and are difficult to appreciate except on vertical air photographs or from an aircraft. The Alaska Highway crosses several areas of glacially streamlined till forms (e.g. Mi 550 to 555) but large drumlin fields are found in more remote areas such as west of the Liard River in the area of Fireside (Mi 543 - Alaska Highway).

An exceptional area of drumlins is located in the upper Smith Valley northeast of the Smith River Military Reserve. Here a rough access road winds across heavily drumlinized terrain and intervening areas of muskeg to beyond the B.C.-Yukon border.

Small end moraines (often interpreted to be annual retreat moraines) were noted at widely scattered and remote portions of the study area.

4.7 ORGANIC FEATURES

Areas of organic soil will be inundated by the proposed reservoir systems. Access roads and a relocated Alaska Highway may cross organic soils particularly on the Alberta Plateau where there is much low relief and poorly drained mineral soils. Organic soils in the Alberta Plateau area are expected to contain discontinuous permafrost which is effectively insulated by near-surface peat (Crampton, 1978). Road construction in areas of permafrost may cause a deterioration of the thermal regime and adverse ponding, blocked cross-drainage and collapse of road grades may result without careful construction and culvert design. Organic soils and valley bottom wetland habitats will be severely impacted or destroyed by the annual flooding and drawdown effects which are expected at the upper limits of the Devil's Gorge and Site G systems.

4.8 MELTWATER CHANNELS

There is a great variety of meltwater channels in the study area. Some meltwater drainageways, such as the system which leads northeast from Fireside to the Coal River, are partially choked with fluvioglacial deposits which buried ice remaining on the pre-existing valley floor. Notably this system is a continuation of a deep channel eroded across a drumlin field west of the Liard River at Fireside.

Other meltwater channels give evidence for spectacular amounts of erosion, perhaps occuring during several glacial periods. The Shaw Creek meltwater channel is 33 km long and discharged eastward from the Coal River to the Smith River Valley. In one sector it is eroded 213 m (700 ft) into limestone bedrock and gives evidence (with others nearby) for meltwater discharge being directed across interfluves by masses of ice blocking the deeper valleys.

Broad floored, outwash filled meltwater channel systems are found in the valley of Graveyard Lakes between the Kechika and Rabbit Rivers, in the Red

River area and west of the Liard River beyond Lower Post.

Glacier ice persisting in the Liard River Valley caused diversions at the lower ends of the Smith and Coal Rivers; each river was diverted by ice through now abandoned outlets to the east. Each abandoned outlet displays much local incision and has kame terraces graded into the Liard Valley. The abandoned Coal River outlet is accessible from the Alaska Highway near Mi 530.

4.9 KARST FEATURES

Carbonate bedrock (limestone and dolomite) is widespread in the Liard Plateau, the Rocky Mountains and the eastern Liard Plain (Gabrielse, 1962). A variety of features observed in these areas are products of solution weathering and erosion of carbonate rock (karst) and include caves, sinkholes, collapse trenches and rock pillars and arches. Hot and cool springs are common in areas of karst. Karst processes are controlled by rock lithology, rock structure, and the pH of naturally occuring waters (Bloom, 1978). In the study area it is probable that the multiple Pleistocene continental glaciations had profound effects on the development and preservation of karst features; it is likely that much karst lies buried beneath the widespread drift of the Liard Plain. Several of the major abandoned meltwater channels across the Liard Plain are deeply incised in limestone bedrock. It is possible that ancient glacial meltwater drainage initially exploited limestone solution features and deepened and extended them to form the remarkable valley system of Shaw Creek between the Smith and Coal Rivers.

Karst features are shown on the terrain maps in Appendix A. Karst is well displayed along sectors of

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the Vents River valley, in bedrock areas of the lower Coal and Smith River valleys and along the Liard River between Liard Hot Springs and the Vents River. Reservior flooding and seasonal drawdown may create localized shoreline rock stability problems in karst areas. The reservior flooding may impinge upon underground karst systems and have impacts on the flows and temperatures of springs outside the reservior area (see Section 4.11). Engineering works related to roads and settlements should give cautious consideration to possible karst features such as caves and sinkholes. Karst features offer potential for public and possible archaeologic interest. Further study will be required to identify karst features which may offer unique attractions to the general and caving public.

4.10 HOT SPRINGS

Several hot springs are located in the Liard Plateau area and are identified on the terrain maps in Appendix A. The most well known springs are found in the Provincial Park near the lower Alaska Highway Crossing of the Liard River. These and other springs are described by McLearn and Kindle (1950, p.147-149), McDonald et al. (1978) and B.C. Hydro (1980).

The springs in the Liard Hot Springs Provincial Park are a unique regional attraction made accessible by the Alaska Highway. These springs will be lost by inundation with the development of the Devil's Gorge reservoir system; the high Beavercrow pondage option will not inundate the park springs but may impact the subsurface hydrologic system which feeds them. The surcharge of the subsurface water that may issue from the reservoir systems may have either beneficial or adverse impacts on hot spring activity; highly detailed and costly studies would be required to evaluate the possibility of these impacts. Thermal infrared mapping offers an excellent means of delineating unknown hot spring areas and providing base line evaluations of present and future thermal regimes. The Portage Brulé Hot Springs on the Liard near the Coal River (Sheet 94M/10) will be inundated by a Devil's Gorge reservoir or will probably suffer adverse impacts from the construction of a nearby Site F dam.

4.11 GRAYLING RIVER HOT SPRINGS AREA

The Grayling River Hot Springs are located beyond the limits of mapping for this study (Appendix A, Sheet 27, NTS 94 N/I2). The springs are described in a report by B.C. Hydro (1980, P. 4-12 to 4-18) where comment is made about the fragility of the spring sites. A brief reconnaissance of the springs was made by Gerath and MacLean in July, 1981. In addition to karst features such as caves near the springs and at locations in a gorge upstream, there are several types of landslides on nearby mountain slopes, ancient glacial features such as meltwater channels and eskers, and relict periglacial features such as boulder fields and rock lobes. This concentration of features commends the Grayling River Hot Springs area to the public interest; with careful development tied to the relocation of the Alaska Highway north of the Devil's Gorge Reservoir, the area may be worthy of park status and might be included as a portion of a larger park encompassing the exceptional terrain near the Beavercrow Reservoir (see Section 4.2).

4.12 SALVAGE GEOLOGICAL INVESTIGATIONS

If plans to build the Liard River dams are approved, salvage geological investigations should be carried out in the reservoir pondage areas. The Geological Survey of Canada, the B.C. Ministry of Mines and Petroleum Resources and the B.C. Ministry of Environment should plan field studies in the region with an awareness of the proposed reservoir systems. Fieldwork related to bedrock geology should be undertaken to document the structural, lithological and stratigraphic relationship of rock units which will be flooded. Special consideration should be given to the identification of karst features which may be uniquely interesting to the public and which may not be affected by the reservoir flooding. Fossil sites to be inundated should be identified and studied in detail. This work should be carried out with the advice and review of geologists who are at present familiar with the geology of the region. Since much of the pondage will cover drift-mantled valley floors, this salvage mapping is likely to be carried out in localized valley sectors where exposures are available.

Fieldwork related to surficial geology should be undertaken to document the lithological and stratigraphic relationships of unconsolidated earth materials in river eroded or landslide scarp sections. The regional stratigraphic framework for Quaternary events is now undeveloped in this remote region; the proposed reservoir pondages may cause this information to be permanently lost without salvage fieldwork by Quaternary geologists. This work will focus on the valley floors where the best sections will be found and may require several field seasons to complete.

4.13 USE OF THE TERRAIN MAPS FOR FURTHER EVALUATIONS

The terrain maps in Appendix A of this report can serve as basic inventory data for a variety of purposes. In order to achieve preliminary evaluations of terrain conditions which may affect future

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development of the region, two reports prepared by the B.C. Ministry of Environment are of interest.

Techniques for evaluating geological hazards from terrain maps are presented by Ryder and MacLean (1980). Methods for evaluating terrain capability for residential developments are presented by Maynard (1979). Detailed studies of terrain hazards, urban suitability, and route locations require the involvement of geotechnical engineers.

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PART TWO: SOILS

Chapter 5

INTRODUCTION

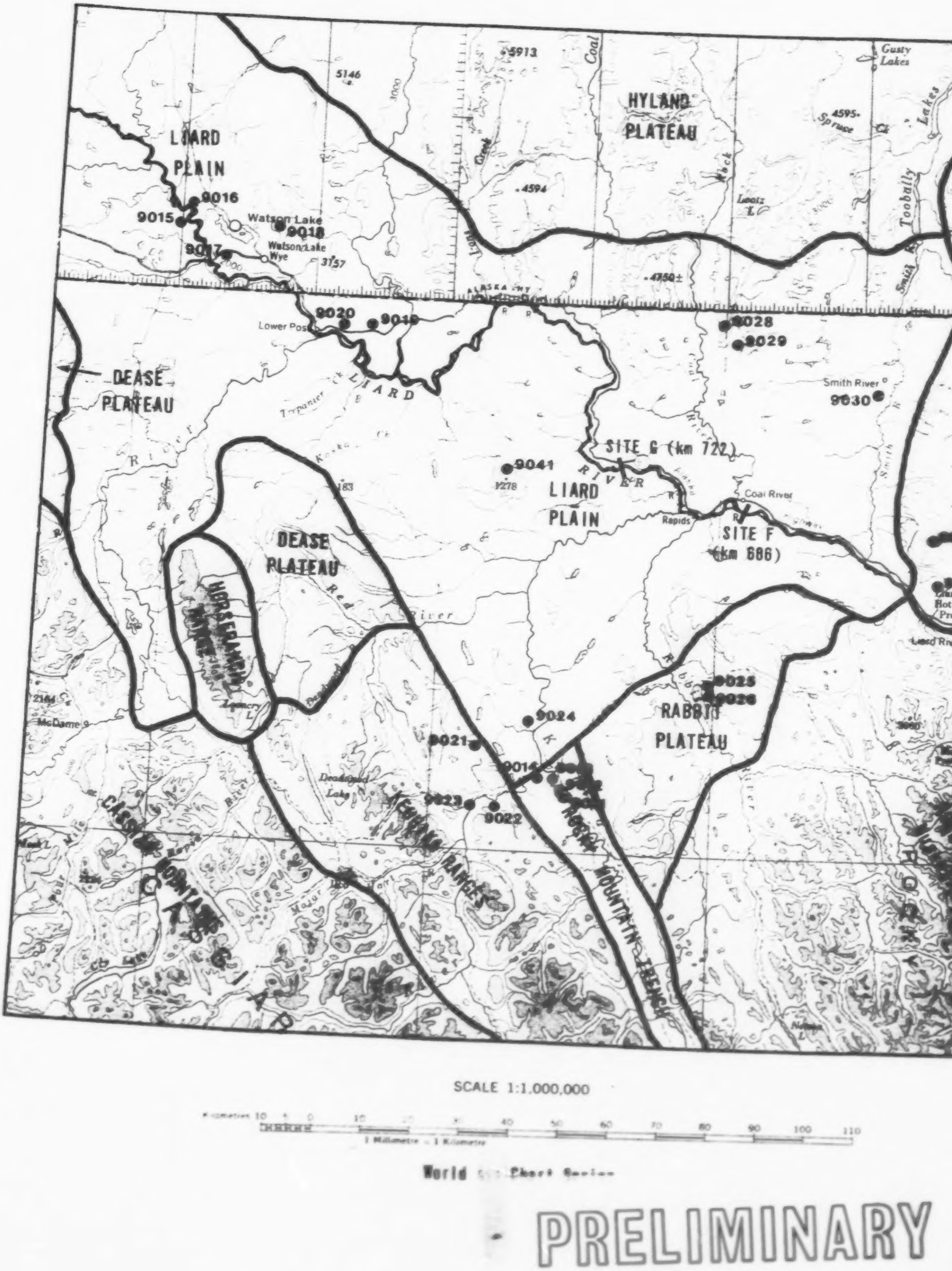
5.1 METHODOLOGY

The soils of the Liard River area are described and classified according to "The Canadian System of Soil Classification" (Agriculture Canada, 1978). They are mapped as Soil Associations which are defined on the basis of physiographic region, climate as evidenced by biogeoclimatic zone, terrain type (landform) and soil development.

Field examination and sampling took place during the summer and fall of 1980. Complete sampling was curtailed due to limited accessibility as the result of poor helicopter flying weather and limited landing sites in treed and burned areas. As many of the defined Soil Associations were described and sampled as possible. However, the mapping relied heavily on air photo interpretation of terrain and landforms and extrapolation of information from adjacent field observation sites plus published information.

5.2 RELIABILITY

The reliability of the soil association mapping is determined by the accuracy of air photo interpretation, the amount of field checking and the amount of representative soil sampling. Field checking and soil sampling were limited by accessibility which was determined by weather for helicopter flying and landing sites. The Alberta Plateau, Liard Plain, Rocky Mountain Trench and Kechicka Ranges regions are relatively well covered. The Rocky Mountains and Rabbit Plateau areas were moderately covered, while the Rocky Mountain Foothills and Liard Plateau regions were poorly covered. The reduced coverage of field checking and soil sampling in these areas was caused by low flying ceilings (frequently below 3000 feet elevation) and other adverse weather.



LIARD PLAIN
HYLAND PLATEAU
DEASE PLATEAU
DEASE PLATEAU
LIARD PLAIN
RABBIT PLATEAU
HORSERANCH RANGE
CASSIAR MOUNTAINS
KECHIKA RANGES
ROCKY MOUNTAIN TRENCH
CASSIAR
ROCKY
SITE G (km 722)
SITE F (km 686)
9014
9015
9016
9017
9018
9019
9020
9021
9022
9023
9024
9025
9026
9028
9029
9030
9041
Watson Lake
Watson Lake Wye
Lower Post
Smith River
Coal River
Rapids
Liard River
McDame
Gusty Lakes
Dease Lake
LIARD RIVER
Coal
Toobally
ALASKA HY
5913
5146
4595
4594
4750±
3157

SCALE 1:1,000,000

Kilometres 10 5 0 10 20 30 40 50 60 70 80 90 100 110

1 Millimetre = 1 Kilometre

World [illegible] Chart Series

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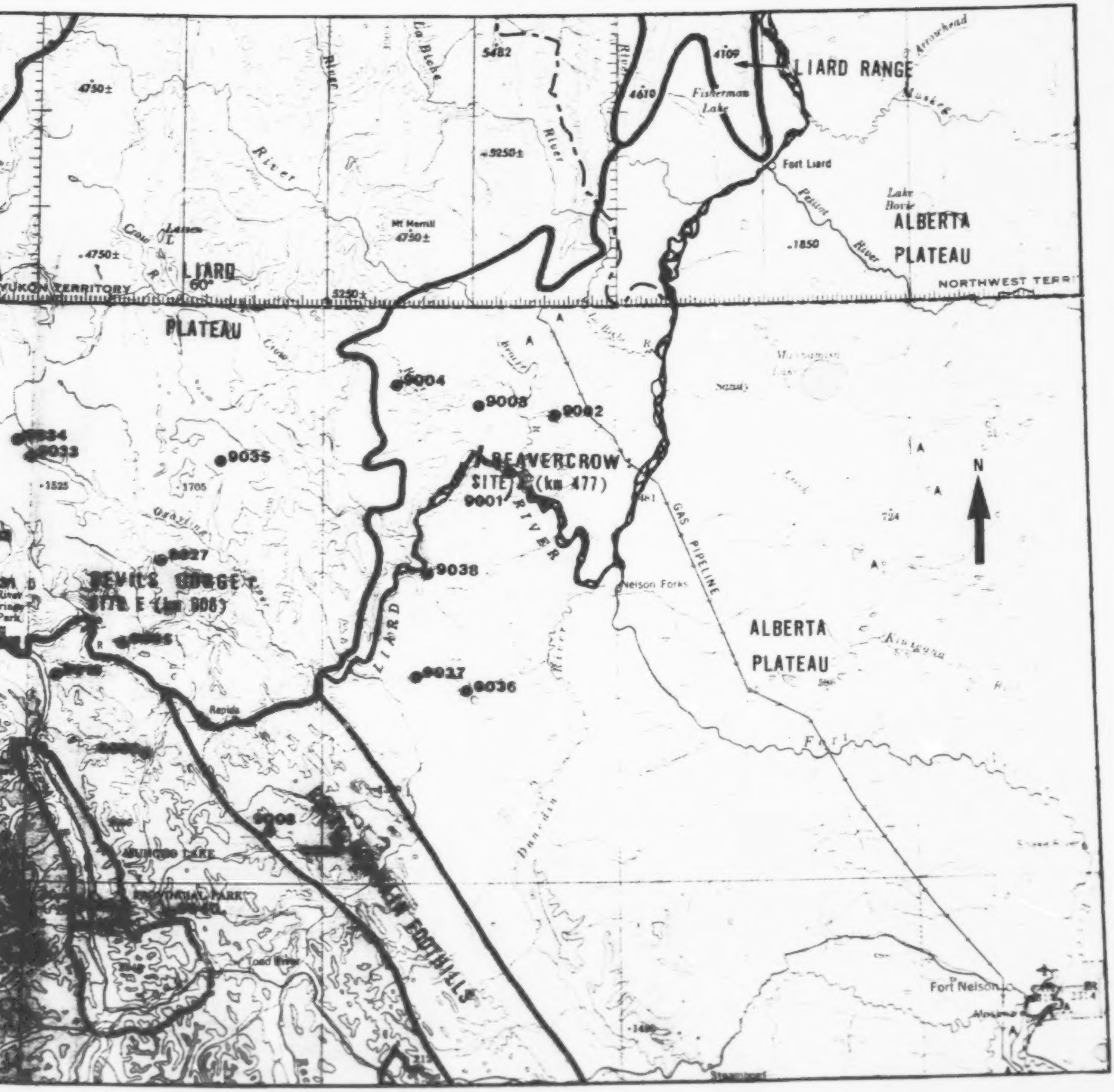

LIARD RANGE
4109
4610
Fisherman Lake
5482
La Biche
Arrowhead
4750±
River
Muskeg
5250±
Fort Liard
Lake Bovie
Mt Merrill 4750±
ALBERTA PLATEAU
Petitot River
.1850
Crow R
Larsen L
.4750±
LIARD
60°
YUKON TERRITORY
3250±
NORTHWEST TERRI
PLATEAU
9004
9008
9002
9034
9033
9035
.1525
.1705
BEAVERCROW SITE (km 477)
9001
RIVER
Grayling
9027
9038
DEVILS GORGE SITE E (km 808)
Nelson Forks
GAS PIPELINE
N
724
ALBERTA PLATEAU
LIARD
9037
9036
Rapids
Fort
MUNCHO LAKE
PROVINCIAL PARK
FOOTHILLS
Toad River
Fort Nelson
.1490
Steamboat

LEGEND:

●9020 Approximate sampling site

1980 SOIL SAMPLING SITE LOCATION MAP

FIGURE 5-1

Figure 5-1 indicates the sampling site locations and gives some indication of the amount of field checking and the subsequent reliability of the soils mapping. The majority of the survey was transected by helicopters.

Chapter 6

BIOGEOCLIMATIC ZONES

The biogeoclimatic zones of the Liard River survey area were defined on a large-scale map and reports by Krajina (1969-76) and Beil *et al*. (1976). Three biogeoclimatic zones occur within the survey area: the alpine tundra, boreal white and black spruce, and spruce-willow-birch.

6.1 ALPINE TUNDRA

The alpine tundra (AT) zone is mostly treeless, but at lower elevations some krummholz forms of alpine fir (*Abies lasiocarpa*), bog birch (*Betula glandulosa*) and occasionally Engelmann spruce (*Picea engelmannii*) whitebark pine (*Pinus albicaulis*) and alpine larch (*Larix lyallii*) occur.

6.2 BOREAL WHITE AND BLACK SPRUCE

The boreal white and black spruce (BWBS) zone generally occurs below 900 to 1050 meters elevation in the Liard River survey area. The most common tree species found in this zone include: white spruce (*Picea glauca*), black spruce (*Picea mariana*), lodgepole pine (*Pinus contorta*), larch (*Larix laricina*) and alpine fir. On the glacial outwash deposits along the Liard River an edaphic climax community of trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), white birch (*Betula papyrifera*) and alder (*Alnus tenuifolia* and *A. crispa*).

6.3 SPRUCE-WILLOW-BIRCH

The spruce-willow-birch (SWB) zone generally occurs between 900 and 1650 meters elevation in the Liard River survey area. The most common trees of this zone include: white spruce, black spruce, alpine fir, alpine larch, willows (Salix sp) lodgepole pine, alder and bog birch.

Figure 6.1 gives a generalized location of these zones as they occur throughout the survey area.

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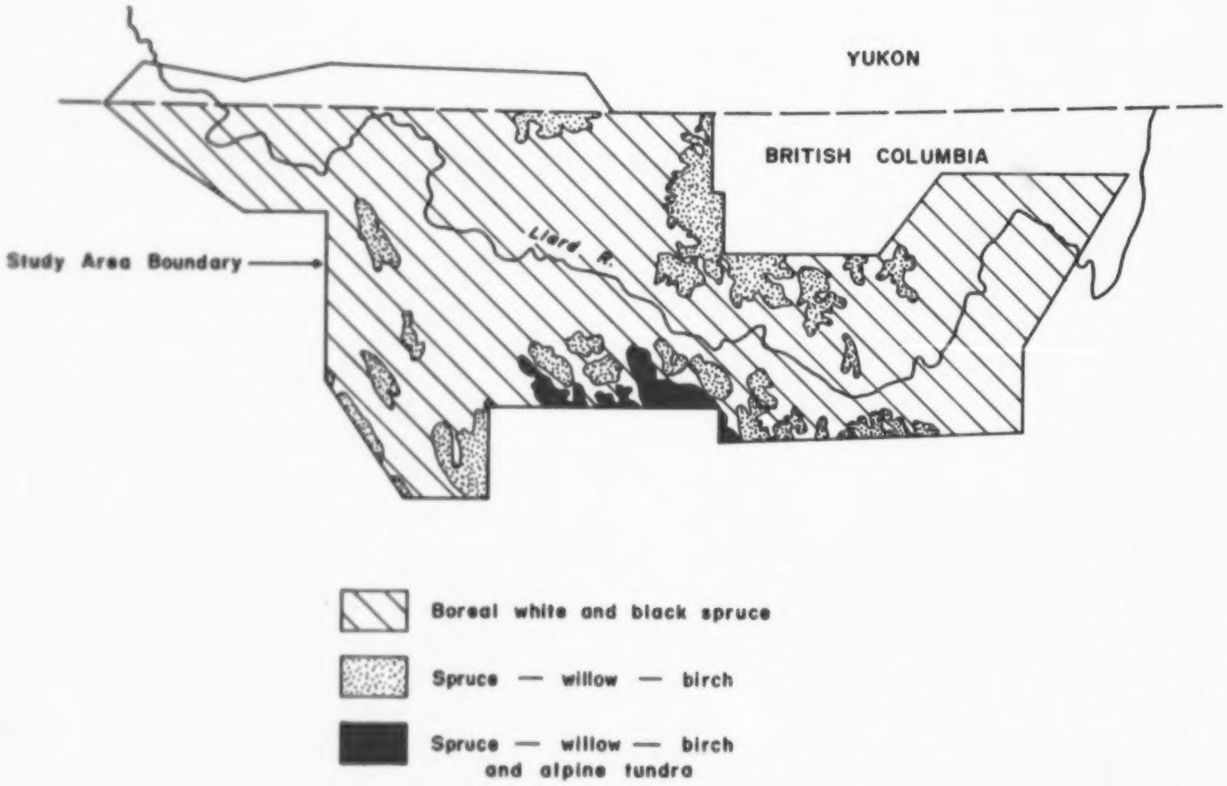
YUKON
BRITISH COLUMBIA
Liard R.
Study Area Boundary
Boreal white and black spruce
Spruce — willow — birch
Spruce — willow — birch and alpine tundra

GENERALIZED BIOGEOCLIMATIC ZONES OF THE LIARD RIVER STUDY AREA, B.C.
(Modified after Krajina, 1969, 1976)

FIGURE 6-1

PRELIMINARY

Chapter 7

SOIL ASSOCIATIONS

7.1 SOILS OF THE ALBERTA PLATEAU

A description of the features of the Alberta Plateau region is contained in Chapter 2, Section 2.4 of this report. The soil parent materials found within this region are primarily flat to gently-sloping lacustrine, morainal, organic, fluvial, colluvial and glaciofluvial materials. Bedrock outcrops occur primarily along the major rivers where they have incised their banks.

The soils located in this region occur entirely within the boreal white and black spruce biogeoclimatic zone.

Soil associations defined for the Alberta Plateau region include: Beaver River, Catkin Creek, Irene Lake, Ruthie Creek, Torpid Creek and Toad River associations and bedrock outcrops.

7.1.1 BWBS Zone

BE Beaver River Association

Map Units of the Beaver River Association

BE - Soils of this map unit have formed in shallow (<1 m) to deep (>2 m) organic deposits overlying lacustrine or morainal material and occasionally bedrock. These soils are usually very poorly drained Fibrisol soils. (Terrain Units: Obv, Ob, Ov, Ovb)

BE-RC$_2$ - This unit contains significant amounts of the well to imperfectly drained, morainal blanket derived, Gray Luvisol soils of the Ruthie Creek Association.
(Terrain Units: Ov = Mb, Ov = Mbv, $\frac{\text{Ov = Mv}}{\text{Rr}}$)

BE-RC$_4$ - A significant portion of this unit consists of well drained, Gray Luvisol soils of the Ruthie Creek Association which have formed in hummocky and subdued deep morainal deposits.
(Terrain Units: Obv = Mhm)

BE-TC - A significant portion of this unit is made up of the moderately well to imperfectly drained, lacustrine derived Luvic or Humic Gleysol of the Torpid Creek Association.
(Terrain Units: Ovb = Lb, Ov = Lb, Obv//Lb, Ova//Lb, Ovb//Lb, Ovb/Lb, Ovb//Llb).

BE-TC$_3$-R - Significant portions of this unit are made up of imperfectly to poorly drained, Gray Luvisol soils of the Torpid Creek Association which are derived from kettled lacustrine deposits and bedrock outcrops.
(Terrain Units: Ovb = Lvb//Rr-H)

BE$_1$- This map unit contains organic soils which are frozen or in which permafrost is encountered within the top meter. These are Organic Cryosol soils.
(Terrain Units: Ova - X, Obv - X)

BE$_1$-IL$_4$ - This map unit contains significant portions of imperfectly drained, frozen, fluvial derived, Regosol soils of the Irene Lake Association.
(Terrain Units: Ova//Flf - X)

BE$_1$-RC$_5$ - The imperfectly drained, sometimes frozen, morainal derived, Gray Luvisol soils of the Ruthie Creek Association make up a significant portion of this map unit.
(Terrain Units: Ova//Mm - X, Ova//Mb - X, Ova/Mb-X)

BE$_1$-TD$_1$ - A significant portion of this unit consists of the well drained, glaciofluvial derived, Humo-Ferric Podzol soil of the Toad River Association.
(Terrain Units: $\frac{\text{Ova/FGbm}}{\text{Lb}}$)

BE$_2$-RC$_6$ - This map unit consists of frozen and channelled, very poorly drained, organic derived, Organic Cryosol soils of the Beaver River Association and significant amounts of the imperfectly drained, morainal derived, Gray Luvisol soils of the Ruthie Creek Association.
(Terrain Units: Obv//Mb - XE)

BE$_3$ - This map unit is dissected by glacial meltwater channels.
(Terrain Unit: Ov-E^{G})

BE$_4$ - This map unit is dissected by glacial meltwater channels and is kettled.
(Terrain Unit: Ov-$\mathrm{E}^{\mathrm{G}_{\mathrm{H}}}$)

A profile description and results of chemical analysis of a Typic Fibrisol of the Beaver River Association is given.

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LIARD RIV[illegible]

Page 1 of 2

Soil Association
BEAVER RIVER

Plot Number
9036-PO

Terrain Classification
$^{O}F_{b}$

N. T. S. Sheet
94N

Soil Moisture Subclass
HUMID

Soil Drainage
VERY POORLY

Perviousness
SLOWLY

Free Water
PRESENT

Flood Hazard
FREQUENT

Depth to: (cm.)
(- if absent)

a. water table	SURFACE
b. rooting (effective)	
c. root restricting layer	
d. frozen layer	
e. bedrock	
f. carbonate	
g. salinity	

Particle Size Analysis

Horizon Desig.	>2mm %	<2mm %	Sand %	Silt %	Clay %	Class
Of		100				–
Cg1		100	1.3	58.7	40.0	SiCl -SiC
Cg2		100	2.8	55.0	42.2	SiC

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Ca	Exchangeable Mg (me/100g)	Na	K	Pyrophosphate Fe (%)	Al (%)	Mn (ppm)	Se (ppm)	Hg (ppb)
Of	5.5	28.47	1.594	22.7	32.8	19.3	4.6	0.34	0.19					
Cg1	5.9	7.48	0.356	6.2	5.8	15.7	2.9	0.11	0.14					
Cg2	6.8												2	50

LIARD RIV **PRELIMINARY**

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Soil Association BEAVER RIVER

Plot Number 9036-80

Horizon Desig	Horizon Depth cm	Horizon Thickness cm Min.	Horizon Thickness cm Max.	Horizon Boundary Dist.	Horizon Boundary Form	Coarse Fragment Descript. % by vol.	Gravel <7.5cm %	Gravel Type	Cobbles 7.5-25 cm %	Cobbles Type	Stones >25 cm %	Stones Type	Soil Texture < 2mm	Structure Primary Grade	Primary Class	Primary Kind	Primary Kind Mod.	Secondary Grade	Secondary Class	Secondary Kind	Secondary Kind Mod.
Of	35-0																				
Cg1	0-25												sil			MA					
Cg2	25-50+												sil	M	M	SBK					

Horizon Desig.	Mst. D M W	Consist. dry	Consist. moist	Consist. wet	Consist. plast.	Colour 1 aspect	Colour 1	Colour 2 aspect	Colour 2	Mottles Ab. F C M	Mottles Si. F M C	Mottles Co. F D P	Mottles aspect	Mottles Colour	Bound. Dis. S C D	Roots 1 Ab. V F P A	Roots 1 Size V F M C	Roots 1 Ori. V H O R	Roots 1 Dist. IN EX MX	Roots 2 Ab. V F P A	Roots 2 Size V F M C	Roots 2 Ori. V H O R	Roots 2 Dist. IN EX MX
Of																							
Cg1						1	BLACK																
Cg2						1	BLACK			M	C	P	1										

Horizon Desig.	Pores Ab. V F P A	Pores Size V F M C	Pores Ori. V H O R	Pores Dist. IN EX MX	Pores Cont. CO DC	Pores Mor. S D C	Pores Type V I T	Hor. Por. S M H	Clay Films Freq. F C M CS	Clay Films Thi. TN MTK TK VTK	Clay Films Loc. 0 to 8	Effer. Deg. VW W M S	Organic Material Description Material Composit. Kind 1	Material Composit. Kind 2	Decom. N S M H	Woody Material Hard. S SH H VH	Woody Material Vol. 0-4	Pyro. Index	von Post Scale	Fiber Analysis Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
Of																				60	12	2
Cg1																						
Cg2																						

CK Catkin Creek Association

Map Units of the Catkin Creek Association

CK - This map unit consists of well to rapidly drained, Regosol soils derived from undifferentiated, unconsolidated glacial materials which are gullied and failing. (Terrain Units: Us-FV)

CK$_1$-R$_8$ - This map unit contains rapidly drained colluvial derived, Regosol soils and significant amounts of bedrock outcrops, both of which are failing, gullied and rapidly mass wasting.
(Terrain Units: Cvm/Rs-FVR, Cvm//Rs-FVR)

CK$_2$ - The soils of this map unit are well drained, Dystric Brunisol soils formed in shallow colluvial materials which are sometimes lithic.
(Terrain Units: Cv, Cvb, Cva)

CK$_2$-BE - This map unit consists of a significant amount of the very poorly drained, organic derived, Fibrisol soils of the Beaver River Association.
(Terrain Units: Cva/Ov)

CK$_2$-R - This map unit contains significant portions of bedrock outcrops which are occasionally hummocky, ridged or steep.
(Terrain Units: Cv//R, Cvb//Rth, Cv/Rs, Cvb//R, Cvb/Rs, Cv/R, Cva//Rs, Cvb/Rr, Cvb//R)

CK$_2$-R-RC$_1$ - Significant amounts of bedrock outcrops and shallow Ruthie Creek Association soils occur within this map unit.
(Terrain Units: Cva/Rrs = Mv)

CK_2-RC - Steep, morainal derived, Regosol soils of the Ruthie Creek Association occupy a significant portion of this map unit.
(Terrain Units: Cvb/Ms)

CK_2-RC_1 - Shallow Ruthie Creek Association soils make up a significant portion of this map unit.
(Terrain Units: Cv/Mv, Cva/Mv, Cv = Mv, Cvb = Mvb)

CK_2-RC_1-R - A significant portion of this 879unit is composed of moderately well drained, Gray Luvisol soils of the Ruthie Creek Association which have developed on shallow morainal material and bedrock outcrops.
(Terrain Units: Cv = Mv/R)

CK_2-RC_2 - This unit has significant amounts of soils of the Ruthie Creek Association which have developed on deeper morainal material.
(Terrain Units: Cv = Mbv, Cb/Mbv, Cv = Mb)

CK_3 - The soils of this map unit are well to rapidly drained, Dystric Brunisol soils derived from deep (>1 m) blanketed colluvial materials.
(Terrain Units: Cbv, Cbr, Cbm, Cbh, Cb, Cba)

CK_3-BE - A significant portion of this unit is occupied by the very poorly drained, Beaver River Association soils.
(Terrain Units: Cb//Ov)

CK_3-IL_3 - The well drained, fluvial derived Regosol soils of the Irene Lake Association occupy significant portions of this map unit.
(Terrain Units: Cba/Pf)

CK_3-R - Bedrock outcrops occupy a significant portion of this unit.
(Terrain Units: Cba//Rh, Cbv//Rs, Cbr/Rs, Cb/Rs, Cbv//R, Cbv/Rs)

CK_3-RC_1 - Shallow Ruthie Creek Association soils occupy a significant portion of this map unit.
(Terrain Units: Cbv/Mv, Cbv//Mv, Cbv = Mvb)

CK_3-RC_2 - A significant amount of this unit is occupied by deep, morainal derived Ruthie Creek Association soils.
(Terrain Units: Cbv/Mbv, Cb/Mb)

CK_3-TC-BE - This map unit consists of significant portions of the poorly drained lacustrine derived, Torpid Creek Association soils and the very poorly drained, organic derived, Beaver River Association soils.
(Terrain Units: Cbr//Lb = Ov)

CK_4 - This map unit consists of well drained, Dystric Brunisol soils formed in colluvial and undifferentiated materials that are actively failing.
(Terrain Units: Cb-F, Us-F, Cbr-F)

CK_4-R_1 - A significant portion of this map unit consists of bedrock outcrops which are also failing.
(Terrain Units: Cbv//R-F, Cm//Rs-F, Cr//Rs-F, Cbm//Rs-F, Cb//Rs-F)

CK_5 - This map unit consists of well to rapidly drained, Dystric Brunisol soils derived from deep colluvial deposits which are gullied.
(Terrain Units: Cb-V, Cbv-V, Cbh-V)

CK_5-IL_1 - A significant portion of this map unit is composed of well drained, fluvial derived, Dystric Brunisol soils of the Irene Lake Association.
(Terrain Units: Cb//Fl)

CK_5-R_6 - Bedrock outcrops which are gullied and failing occur in a significant portion of this map unit.
(Terrain Units: Cb = Rs-FV, Cb/Rs-VF, Cbm//Rs-FV, Cbv/Us = Rs-FV, Cbv/Rs-FV, Cbh//Rs-FV)

CK_6-R-RC_3 - This map unit consists of well drained, colluvial derived, Dystric Brunisol soils, of the Catkin Creek Association, bedrock outcrops and moderately well drained, morainal derived, Gray Luvisol Ruthie Creek Association soils all of which are subject to rapid mass wasting.
(Terrain Units: Cv//Rs = Mvb-R)

CK_7 - The soils of this map unit are gullied by water erosion.
(Terrain Units: Cva-V, Cb-V, Cba-V, Cva-V, Cbv-V, Cvb-V, Us-V, Cbm-V, Cbr-V)

CK_7-R_2 - A significant portion of this map unit is occupied by bedrock outcrops which are also gullied.
(Terrain Units: Cbv/Rs-V, Cbv//R-V, Cvb//Rs-V, Cv/Rs-V, Cvb/Rs-V, Cb/Rs-V, Cbr/Rs-V, Cbv/R-V, Cv = Rs-V, Cb//Rs-V)

CK_7-RC_3 - Well drained, morainal derived, Gray Luvisol, Ruthie Creek Association soils which are also gullied occupy a significant portion of this map unit.
(Terrain Units: Cbv/Mbv-V, Cbv/Mvb-V, Cb = Mb-V, Cb/Mb-V)

CK_8 - This map unit is composed of well to moderately well drained, deep, colluvial derived, Regosol soils of the Catkin Creek Association which are subdued, ridged or steep landslide deposits.
(Terrain Units: Cm, Cmf, Crb, Chr, Us)

CK_{10}-IL_1 - The soils of this unit are well drained, colluvial fan derived, Dystric Brunisol and well drained, fluvial terrace derived, Dystric Brunisol, Irene Lake Association soils.
(Terrain Units: Cfb/Ft)

A profile description of a Regosol soil of the Catkin Creek Association is given.

PRELIMINARY

LIARD RIVI

Page 1 of 2

Soil Association: CATKIN CREEK

Plot Number: 9038-80

Terrain Classification: gfCh

N. T. S. Sheet: 94N

Soil Moisture Subclass: HUMID

Soil Drainage: WELL

Perviousness: MODERATELY

Free Water: ABSENT

Flood Hazard: NO HAZARD

Depth to: (cm.)
(- if absent)

a. water table ~20
b. rooting (effective) —
c. root restricting layer —
d. frozen layer —
e. bedrock —
f. carbonate 10
g. salinity —

Particle Size Analysis

Horizon Desig.	>2mm %	<2mm %	Sand %	Silt %	Clay %	Class
C	37	63	40.3	38.0	21.7	l
Cca						
IIC	25	75	83.5	9.9	6.6	ls

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available		Exchangeable				Pyrophosphate			Se (ppm)	Hg (ppb)
				P (ppm)	S (ppm)	Ca	Mg (me/100g)	Na	K	Fe (%)	Al (%)	Mn (ppm)		
C	7.5												1	60
Cca														
IIC	7.6												2	60

LIARD RIV **PRELIMINARY**

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Soil Association CATKIN CREEK

Plot Number 9032-PC

Horizon Desig	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5cm		Cobbles 7.5 - 25 cm		Stones >25cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
C	~10m												gsil								
Cca	10m												gsil								
IIC	>10m												s								

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles					Bound. Dis.	Roots 1				Roots 2			
										Ab.	Si.	Co.	Colour			Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast.	aspect		aspect		F C M	F M C	F D P	aspect		D C S	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
C																							
Cca																							
IIC																							

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material		Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W M S	Kind 1	Kind 2	Decom N S M H	Hard S SH H VH	Vol. 0-1-2-3-4					
C																						
Cca																						
IIC																						

IL Irene Lake Association

Map Units of the Irene Lake Association

IL - This map unit consists of well to poorly drained, fluvial derived, Regosol or Dystric Brunisol soils of the Irene Lake Association.
(Terrain Unit: Fts//FA_1)

IL_1 - This map unit consists of well to moderately well drained, level, terraced and sometimes steep, fluvial derived, Dystric Brunisol soils.
(Terrain Units: Ftl, Ft, Fl, Fts)

IL_1-BE - A significant portion of this map unit is very poorly drained, organic derived, Fibrisol, Beaver River Association soils.
(Terrain Units: Flt = Ov, Fl = Ov)

IL_1-CK - A minor but significant portion of this unit is composed of well drained, undifferentiated unconsolidated material derived, Regosol soils of the Catkin Creek Association.
(Terrain Unit: Ftl//Us)

IL_1-CK_2-BE - This unit is composed of a significant portion of shallow Catkin Creek and Beaver River Association soils.
(Terrain Unit: Fl = Cv/Ov)

IL_1-CK_5-BC - A significant portion of this unit is composed of deep Catkin Creek Association and Beaver River Association soils.
(Terrain Unit: Fl/Cb = Ov)

IL$_2$ - The soils of this map unit are imperfectly to poorly drained, Regosol soils derived from active and inactive floodplain deposits which are being actively channelled by stream action.
(Terrain Units: $F^{A}1$-E^{A}, Ft = $^{A}1$-E^{A}, $F^{A}1$/Ft-E^{A})

IL$_2$-BE - A significant portion of this map unit is occupied by Beaver River Association soils.
(Terrain Units: Ftl/$F^{A}1$ = Ov-E^{A})

IL$_3$ - The soils of this map unit are well drained, Dystric Brunisol soils which have formed in fluvial fan deposits.
(Terrain Unit: Ff)

IL$_3$-BE - A significant portion of this map unit consists of Beaver River Association soils.
(Terrain Unit: Ff/Ov)

IL$_3$-BE-CK$_{10}$ - This map unit contains a significant portion of Beaver River Association soils and well drained, Dystric Brunisol colluvial fan derived soils of the Catkin Creek Association.
(Terrain Unit: Ff/Ovb/Cfv)

IL$_5$ - This map unit consists of soils derived from fluvial terrace deposits which have been channelled. The soils are well to poorly drained, Dystric Brunisol and Gleysol soils.
(Terrain Unit: Ft-E)

IL$_5$-BE - A significant portion of this unit is occupied by Beaver River Association soils.
(Terrain Unit: Ft//Ov-E)

IL_6 - Soils of this map unit are well drained, Dystric Brunisol soils derived from terraced and steep fluvial deposits which are gullied. (Terrain Unit: Fts-V)

A profile description of a Regosol soil of the Irene Lake Association is given.

PRELIMINARY

LIARD RIVE...

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Soil Association IRENE LAKE

Plot Number 9001 - 80

Terrain Classification sFl

N. T. S. Sheet 94N

Soil Moisture Subclass SUBHUMID

Soil Drainage WELL

Perviousness MODERATELY

Free Water ABSENT

Flood Hazard MAY BE EXPECTED

Depth to: (cm.)
(- if absent)

a. water table	–
b. rooting (effective)	> 50
c. root restricting layer	–
d. frozen layer	–
e. bedrock	–
f. carbonate	–
g. salinity	–

Particle Size Analysis

Horizon Desig.	>2mm %	<2mm %	Sand %	Silt %	Clay %	Class
LF						
C						
Ahb						
C_2						
Ahb_2						
C_3		100	48.7	32.6	18.7	!

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available		Exchangeable				Pyrophosphate			Se (ppm)	Hg (ppb)
				P (ppm)	S (ppm)	Ca	Mg (me/100g)	Na	K	Fe (%)	Al (%)	Mn (ppm)		
LF														
C														
Ahb														
C_2														
Ahb_2														
C_3	7.4	3.44	0.155	5.5	14.0	16.3	3.3	0.17	0.24				2	100

LIARD RIV

PRELIMINARY

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Soil Association IRENE LAKE

Plot Number 7001-70

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
LF	2-0	0	3	G	S																
C	0-11	9	13	G	S								sl			SGR					
Ahb	11-18	5	7	C	S								f	W	M	PL	PS				
C2	18-37	16	22	D	W								l			SGR					
Ahb2	37-42	5	7	D	W								l	W	M	PL	PS				
C3	42-50+												sl			SGR					

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles						Roots 1				Roots 2			
										Ab.	Si.	Co.	Colour		Bound. Dis.	Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast.	aspect		aspect		F C M	F M C	F D P	aspect		S C D	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
LF																							
C	M		3	1	1	1	10YR 3/3									F	F	H	MX				
Ahb	M		3	2	2	1	10YR 3/2									P	F	O	EX				
C2	M		3	2	2	1	2.5Y 4/2									P	M	O	MX				
Ahb2	M		3	2	2	1	10YR 3/4									A	F	O	EX				
C3	M		3	2	2	1	10YR 3/3									P	C	O	MX				

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material		Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
													Kind 1	Kind 2	Decom.	Hard.	Vol.					
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W M S			N S M H	S SH H VH	0 1 2 3 4					
LF																						
C	F	F	H	MX	Co	S	V	S														
Ahb	A	M	H	EX	CO	D	I	M														
C2	F	F	O	MX	DC	S	I	S														
Ahb2	P	M	O	EX	DC	D	I	M														
C3																						

PRELIMINARY

RC Ruthie Creek Association

Map Units of the Ruthie Creek Association

RC - The soils of this map unit are well drained, Gray Luvisol soils derived from steep morainal material.
(Terrain Unit: Ms)

RC_1 - The soils of this map unit are well drained, Gray Luvisol soils derived from shallow (<1 m) morainal materials which are occasionally lithic.
(Terrain Units: Mvb, Mv)

RC_1-BE-R - Significant portions of this map unit consists of Beaver River Association soils and bedrock outcrops.
(Terrain Units: Mv/Ov/R, Mvb/Ov/R)

RC_1-CK_2 - This map unit contains a significant amount of shallow (>1 m) Catkin Creek Association soils.
(Terrain Units: Mv//Cv, Mv = Cv, Mv/Cv)

RC_1-CK_2-R - Significant portions of this unit are composed of shallow (>1 m) Catkin Creek Association soils and bedrock outcrops.
(Terrain Unit: Mv/Cv/R)

RC_1-R - A significant portion of this map unit is composed of bedrock outcrops.
(Terrain Units: Mvb//R, Mv = R, Mv/R, Mvb//Rr, Mvb/R, Mv//R)

RC_1-R-BE - Bedrock outcrops and Beaver River Association soils occupy significant amounts of this unit.
(Terrain Unit: Mvb//Rr = Ov)

RC_1-R-CK_2 - Shallow (<1 m) Catkin Creek Association soils and bedrock outcrops occupy significant portions of this unit. (Terrain Unit: Mv = R/Cv)

RC_2 - This map unit contains moderately well drained, Gray Luvisol soils, derived from deep (>1 m) morainal deposits. (Terrain Units: Mb, Mbv, Mbm)

RC_2-BE - Beaver River Association soils occupy a significant portion of this unit. (Terrain Units: Mb//Ov, Mb/Ov, Mbv//Ov, Mb = Ovb, Mb = Ov, Mbv/Ov, Mb/Ovb, Mbr//Ov)

RC_2-BE-CK_2 - Significant portions of this unit are composed of Beaver River Association soils and deep (>1 m) Catkin Creek Association soils. (Terrain Units: Mb/Ov = Cv, Mbr/Ov = Cv)

RC_2-CK_2 - Shallow (<1 m) Catkin Creek Association soils occupy a significant amount of this map unit. (Terrain Units: Mbv/Cv, Mbv = Cv, Mbr//Cv, Mb//Cv, Mb/Cva)

RC_2-CK_2-BE - Shallow (<1 m) Catkin Creek Association soils and Beaver River Association soils occupy significant portions of this map unit. (Terrain Unit: Mb/Cv/Ov)

RC_2-CK_3 - Deep (>1 m) and shallow (<1 m) Catkin Creek Association soils occupy a significant portion of this map unit. (Terrain Unit: Mbv = Cbv)

RC_2-R-BE - Bedrock outcrops and Beaver River Association soils occupy significant portions of this map unit.
(Terrain Units: Mbv//R = Ov, Mbv/Rrh = Ov, Mbr/Rr/Ov)

RC_3 - The soils of this map unit are moderately well drained, Gray Luvisol soils derived from deep ($>$1 m) morainal deposits which are gullied.
(Terrain Units: Mmb-V, Mbv-V)

RC_3-BE - Beaver River Association soils occupy a significant portion of this map unit.
(Terrain Units: Mbr//Ov-V, Mb/Ovb-V, Mb/Ov-V)

RC_3-CK_7 - Gullied Catkin Creek Association soils occupy a significant portion of this map unit.
(Terrain Units: Mbv/Cv-V, Mbv = Cab-V)

RC_4 - This map unit consists of moderately well drained, Gray Luvisol soils developed on rolling and drumlinized morainal materials.
(Terrain Units: Mmb, Mrb, Mm, Mmr)

RC_4-BE - Beaver River Association soils occupy a significant portion of this map unit generally occuring in depressions.
(Terrain Units: Mrb//Ov, Mmb/Ova)

RC_4-CK_3 - Catkin Creek Association soils occupy a significant portion of this unit.
(Terrain Unit: Mmb/Cbv)

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RC_6-BE_2 - This map unit consists of Ruthie Creek Association and Beaver River Association soils which are channelled and have permafrost within 1 (organic) to 2 (mineral) meters of the surface.
(Terrain unit: Mm/Ova-EX)

RC_7 - This map unit consists of moderately well drained, Gray Luvisol soils derived from morainal materials which are dissected by meltwater channels.
(Terrain Unit: Mb-E^G)

RC_7-BE_3 - Beaver River Association soils occupy the base of the meltwater channels of this map unit.
(Terrain Unit: Mb = Ov-E^G)

RC_8-C_{11} - Gullied and meltwater channel dissected Catkin Creek Association soils make up a significant portion of this map unit.
(Terrain Unit: Mb/Cba-VE^G)

RC_9-BE_5 - Beaver River Association soils which are gullied and frozen occupy a significant portion of this map unit.
(Terrain Unit: Mb/Ovb-VX)

RC_{10} - This map unit is subject to rapid mass wasting.
(Terrain Unit: Mv-R)

A profile description of a Gray Luvisol of the Ruthie Creek Association is given.

LIARD RIVE PRELIMINARY

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Soil Association RUTHIE CREEK

Plot Number 9037-80

Terrain Classification Mb

N. T. S. Sheet 94N

Soil Moisture Subclass HUMID

Soil Drainage POORLY

Perviousness SLOWLY

Free Water PRESENT

Flood Hazard NO HAZARD

Depth to: (cm.)
(- if absent)

a. water table	SURFACE (PERCHED)
b. rooting (effective)	53
c. root restricting layer	53
d. frozen layer	—
e. bedrock	—
f. carbonate	—
g. salinity	—

Particle Size Analysis

Horizon Desig.	>2mm %	<2mm %	Sand %	Silt %	Clay %	Class
Ah$_1$		100	13.4	58.9	27.7	SiCl
Ah$_2$		100	29.5	52.3	18.2	Sil
II Ae						
II Bt	2	98	31.1	56.4	12.5	Sil

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca (me/100g)	Exchangeable Mg (me/100g)	Exchangeable Na (me/100g)	Exchangeable K (me/100g)	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
Ah$_1$	5.4	5.90	0.349	6.2	3.7	9.1	2.1	0.14	0.12					
Ah$_2$	7.0	1.72	0.124	6.4	1.0	10.6	1.9	0.09	0.10					
II Ae														
II Bt	7.7													
													1	40

LIARD RIV

PRELIMINARY

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Soil Association RUTHIE CREEK

Plot Number 9037 - PC

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
Ah1	0-16												si	W	M	GR					
Ah2	16-45												si								
IIAe	45-53					40	60	S	40	S			gc								
IIBt	53-65+					50	60	S	40	S			gcl	W	F	SBK					

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles					Bound. Dis.	Roots 1				Roots 2			
										Ab.	Si.	Co.	Colour			Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast.	aspect		aspect		F C M	F M C	F D P	aspect		D C S	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
Ah1																							
Ah2																							
IIAe																							
IIBt																							

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material		Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W MS S	Kind 1	Kind 2	Decom. N S M H	Hard. S SH H VH	Vol. 0-1-2-3-4					
Ah1																						
Ah2																						
IIAe																						
IIBt																						

TC Torpid Creek Association

Map Units of the Torpid Creek Association

TC - This map unit is composed of imperfectly to poorly drained, lacustrine derived, Luvic or Humic Gleysol soils which are commonly Peaty Phase.
(Terrain Units: Lb, Lbv)

TC-BE - Beaver River Association soils occupy a significant portion of this map unit.
(Terrain Units: Lb = Ov, Lb/Ov, Lb//Ov, $\frac{Lb/Ov}{Mb}$)

TC_1-BE_3 - Beaver River Association soils occupy the floor of the meltwater channels found dissecting this map unit.
(Terrain Unit: Lb/Ov-EG)

TC_2-BE_4 - Beaver River Association soils occupy the floor of the meltwater channels and some of the kettle holes that occur in this map unit.
(Terrain Unit: Lb/Ov-EG_H)

TC_3 - This map unit consists of imperfectly to poorly drained, Luvic or Humic Gleysol soils derived from kettled lacustrine deposits.
(Terrain Units: Lb-H, Lbm-H)

TC_4-BE - Beaver River Association soils occur in conjunction with the Torpid Creek soils which are kettled and failing.
(Terrain Unit: Lbm/Ov-HF)

TC_5 - This map unit is highly gullied.
(Terrain Unit: Lb-V)

A profile description of a Luvic Gleysol of the Torpid Creek Association is given.

LIARD RIV **PRELIMINARY**

Page 1 of 2

Soil Association TORPID CREEK

Plot Number 9002-80

Terrain Classification $\frac{hOv}{sLb}$

N.T.S. Sheet 94N

Soil Moisture Subclass SUBHUMID

Soil Drainage POORLY

Perviousness SLOWLY

Free Water PRESENT

Flood Hazard NO HAZARD

Depth to: (cm.)
(- if absent)

a. water table 20 cm FROM ORGANIC SURFACE
b. rooting (effective) 31
c. root restricting layer 31
d. frozen layer —
e. bedrock —
f. carbonate —
g. salinity -

Particle Size Analysis

Horizon Desig.	>2 mm %	<2 mm %	Sand %	Silt %	Clay %	Class
LF						
Oh						
Ah						
Ahe						
Bm						
Bt		100	12.2	67.4	20.4	SiL

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca (me/100g)	Exchangeable Mg (me/100g)	Exchangeable Na (me/100g)	Exchangeable K (me/100g)	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
LF														
Oh														
Ah														
Ahe														
Bm														
Bt	8.0					9.6	2.9	0.13	0.13				2	60

LIARD RIV **PRELIMINARY**

Page 2 of 2

Soil Association TORPID CREEK

Plot Number 9002-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm Min.	Horizon Thickness cm Max.	Horizon Boundary Dist.	Horizon Boundary Form	Coarse Fragment Descript. % by vol.	Gravel <7.5cm %	Gravel Type	Cobbles 7.5 - 25 cm %	Cobbles Type	Stones >25 cm %	Stones Type	Soil Texture < 2mm	Structure Primary Grade	Primary Class	Primary Kind	Primary Kind Mod.	Secondary Grade	Secondary Class	Secondary Kind	Secondary Kind Mod.
LF	20-15	3	7	D	S																
Oh	15-0	12	15	D	S								h								
Ah	0-10	9	12	G	W								l-sil	W	M	GR					
Ahe	10-20	9	12	C	W								sil	WM	M	PL					
Bm	20-31	10	13	D	W								cl	W	MC	SBK					
Bt	31-50+												cl	M	F	SBK					

Horizon Desig.	Mst. D M W	Consist. dry	moist	wet	plast.	Colour 1 aspect	Colour 1	Colour 2 aspect	Colour 2	Mottles Ab. F C M	Si. F M C	Co. F D P	Colour aspect	Colour	Bound Dis. D C S	Roots 1 Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX	Roots 2 Ab V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX
LF																							
Oh																							
Ah	W			2	2	1	10 YR 2/1									A	M	O	MX				
Ahe	M		3	3	3	1	10 YR 3/2			C	M	D	1	7.5 YR 4/6	C	F	F	O	EX				
Bm	W			3	3	1	2.5 Y 4/2			C	C	F	1	2.5 Y 4/4	D	F	F	O	EX				
Bt	W			3	3	1	2.5 Y 4/4			F	C	F	1	2.5 Y 5/6	D								

Horizon Desig.	Pores Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX	Cont. CO DC	Mor. S D C	Type V I T	Hor. Por S M H	Clay Films Freq. F C M CS	Thi. TN MTK TK VTK	Loc. 0 to 8	Effer. Deg. VW W M S	Organic Material Description Material Composit. Kind 1	Kind 2	Decom N S M H	Woody Material Hard S SH H VH	Vol. 0-1-2-3-4	Pyro. Index	von Post Scale	Fiber Analysis Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
LF																						
Oh													4		H	S	1	1	c8			
Ah	P	F	O	MX	DC	D	1	M														
Ahe	V	F	O	EX	DC	D	1	M														
Bm	V	M	O	EX	DC	D	1	M														
Bt								M														

TD Toad River Association

Map Units of the Toad River Association

TD - This map unit is composed of well drained, Humo-Ferric Podzol soils, developed on glaciofluvial deposits.
(Terrain Unit: $F^{G}b$)

TD-BE - Beaver River Association soils occupy a significant portion of this map unit.
(Terrain Unit: $\frac{F^{G}bv/Ov}{Lb}$)

TD-BE-TC - Beaver River Association and Torpid Creek Association soils occupy significant portions of this map unit.
(Terrain Unit: $F^{G}bv = Ovb/Lb$)

TD_2-BE_4-TC_2 - This map unit is covered with kettle holes and meltwater channels which contain Beaver River Association and Torpid Creek Association soils.
(Terrain Unit: $F^{G}b/Ovb = Lb\text{-}HE^{G}$)

TD_3 - This map unit is composed of well drained, Humo-Ferric Podzol soils developed on subdued and hummocky glaciofluvial deposits.
(Terrain Unit: $F^{G}hm$)

TD_5 - This map unit is composed of well drained, Humo-Ferric Podzol soils developed on level glaciofluvial deposits which are kettled.
(Terrain Unit: $F^{G}l\text{-}H$)

TD_6 - This map unit is terraced.
(Terrain Unit: $F^{G}t$)

A profile description of a Humo-Ferric Podzol of the Toad River Association is given.

PRELIMINARY

LIARD RIVL.. [illegible]

Page 1 of 2

Soil Association

TOAD RIVER

Plot Number

9003 - 80

Terrain Classification

$sF^{G}1$

N. T. S. Sheet

92 N

Soil Moisture Subclass

SUBHUMID

Soil Drainage

WELL

Perviousness

RAPIDLY

Free Water

ABSENT

Flood Hazard

NO HAZARD

Depth to: (cm.)
(- if absent)

a. water table	–
b. rooting (effective)	45
c. root restricting layer	–
d. frozen layer	–
e. bedrock	–
f. carbonate	–
g. salinity	–

Particle Size Analysis

Horizon Desig.	>2 mm %	<2 mm %	Sand %	Silt %	Clay %	Class
LF						
Ae						
Bf_1		100	32.7	56.5	10.8	Sil
Bf_2		100	76.9	15.6	7.5	Sl
BC						
C		100	85.0	8.0	7.0	ls

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca (me/100g)	Exchangeable Mg (me/100g)	Exchangeable Na (me/100g)	Exchangeable K (me/100g)	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
LF					–									
Ae														
Bf_1	5.0	0.89	0.055	481.2	1.1	0.6	0.1	0.11	0.16	0.51	0.44	74		
Bf_2	5.5	0.16	0.028	110.0	0.1	0.8	0.3	0.13	0.16	0.21	0.38	40		
BC														
C	5.6												2	80

LIARD RIVI PRELIMINARY

Page 2 of 2

Soil Association TOAD RIVER

Plot Number 90c3-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
LF	13-0	10	15	C	S																
Ae	0-9	6	12	G	W								sl	WM	M	PL					
Bf$_1$	9-17	6	9	G	S								l-sil	WM	M	SBK					
Bf$_2$	17-26	6	11	D	S								ls			MA				SGR	
BC	26-45	12	15	D	S								ls			SGR					
C	45-65+												ls			SGR					

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles						Roots 1				Roots 2			
										Ab.	Si.	Co.	Colour		Bound. Dis.	Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast.	aspect		aspect		F C M	F M C	F D P	aspect		D C S D	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
LF																							
Ae	M		2	1	1	1	7.5 YR 5/2									P	C	H	MX				
Bf$_1$	M		4	2	2	1	5 YR 4/6									P	M	H	MX				
Bf$_2$	M		2	1	1	1	5 YR 4/4									V	F	O	MX				
BC	M		1	1	1	1	7.5 YR 3/4									V	F	O	MX				
C	M		1	1	1	1	10 YR 3/4																

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material		Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W M S	Kind 1	Kind 2	Decom N S M H	Hard S SH H VH	Vol 0-1-2-3-4					
LF																						
Ae	P	F	R	MX	CO	D	I	H														
Bf$_1$	P	F	R	EX	CO	D	I	M														
Bf$_2$	P	V	R	MX	DC	D	I	H														
BC	P	V	R	MX	DC	D	I	H														
C	P	V	R	MX	DC	D	I	H														

PRELIMINARY

7.2 SOILS OF THE KECHIKA RANGES

A description of the features of the Kechika Ranges region is contained in Chapter 2, Section 2.10 of this report. The soil parent materials found in this region are primarily moderately to steeply sloping colluvial and morainal deposits with large areas of bedrock outcrops and minor glaciofluvial and fluvial deposits.

Both the boreal black and white spruce and the spruce-willow-birch biogeoclimatic zones occur in this region. The SWB zone is the most extensive.

The soil associations described for this region include: Hidden Valley Creek, Range, Sandpile Creek, Turnagain Creek and Valley associations which are discussed in the sections following.

7.2.1 BWBS and SWB Zones

HV Hidden Valley Creek Association

Map Units of the Hidden Valley Association.

HV_1 - This map unit consists of well to rapidly drained, Eutric Brunisol soils developed on terraced glaciofluvial deposits.
(Terrain Unit: FG_t)

HV_2 - This map unit is kettled.
(Terrain Unit: FG_{t-H})

PRELIMINARY

RA Range Association

Map Units of the Range Association

RA - This map unit consists of well to imperfectly drained, Eutric Brunisol or Gray Luvisol soils derived from gullied morainal materials. Terrain Units: M, M-V)

RA-R - Bedrock outcrops constitute a major portion of this map unit. (Terrain Units: M-V/R)

RA_1 - This map unit consists of well drained, Eutric Brunisol soils, which have developed in shallow (<1 m) morainal materials and are often lithic. (Terrain Unit: Mv)

RA_1-R - Bedrock outcrops occupy a significant portion of this map unit. (Terrain Unit: Mv = R)

RA_2 - This map unit consists of well to moderately well drained, Gray Luvisol soils which have developed in deep (>1 m) morainal materials. (Terrain Unit: Mb)

RA_3 - Shallow (<1 m) and deep (>1 m) morainal material characterize this unit. (Terrain Unit: Mbv)

A profile description of a Eutric Brunisol of the Range Association is given.

LIARD RIV **PRELIMINARY**

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Soil Association RANGE

Plot Number 9022-80

Terrain Classification gfMb

N. T. S. Sheet 94 M

Soil Moisture Subclass SUBHUMID

Soil Drainage WELL

Perviousness MODERATELY

Free Water ABSENT

Flood Hazard NO HAZARD

Depth to: (cm.)
(- if absent)

a. water table	–
b. rooting (effective)	35
c. root restricting layer	35
d. frozen layer	–
e. bedrock	–
f. carbonate	SURFACE
g. salinity	–

Particle Size Analysis

Horizon Desig.	>2 mm %	<2 mm %	Sand %	Silt %	Clay %	Class
LFH						
Bmk	26	74	36.3	47.6	16.1	1
BCk						
Ck	46	54	32.1	45.3	22.6	1

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca (me/100g)	Exchangeable Mg (me/100g)	Exchangeable Na (me/100g)	Exchangeable K (me/100g)	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
LFH														
Bmk	7.2	1.20	0.082	5.5	1.0	10.3	1.0	0.12	0.31					
BCk														
Ck	8.0													
													2	160

LIARD RIV **PRELIMINARY**

Page 2 of 2

Soil Association RANGE

Plot Number 9022-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5 cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
LFH	5-0	3	6	A	S																
Bmk	0-12	10	16	G	S	40	75	S	25	S			gsicl	WM	M	SBK					
BCk	12-33	18	22	G	S	50	60	S	30	S	10	S	gsicl	M	M	SBK		M	F	GR	
Ck	33-37+					50	60	S	30	S	10	S	gsicl	M	M	SBK					

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles					Bound. Dis.	Roots 1				Roots 2			
										Ab.	Si.	Co.	Colour			Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast.	aspect		aspect		F C M	F M C	F D P	aspect		D C S	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
LFH																							
Bmk	M		2	2	3	1	10YR 4/6									P	F	O	MX	F	C	H	MX
BCk	M		2	2	3	1	2.5Y 4/4									P	F	O	MX				
Ck	M		4	3	3	1	10YR 4/3									P	V	O	EX				

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material		Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	O to 8	VW W M S	Kind 1	Kind 2	Decom. N S M H	Hard. S SH H VH	Vol. O-1-2-3-4					
LFH																						
Bmk	P	F	R	EX	CO	D	I	M				M										
BCk	P	F	R	EX	CO	D	I	M				M										
Ck	P	F	O	EX	CO	D	I	S				S										

SC Sandpile Creek Association

Map Units of the Sandpile Creek Association

SC_1 - This map unit consists of well drained, Eutric Brunisol soils developed fluvial apron deposits.
(Terrain Unit: Fa, Ff)

SC_2 - Soils of this map unit are well drained, Eutric Brunisol, derived from terraced fluvial deposits.
(Terrain Unit: Ft)

SC_3 - The soils of this unit are well to poorly drained, Regosol or Gleysol soils developed in active floodplain deposits.
(Terrain Unit: FA_1)

A profile description of an Eutric Brunisol soil of the Sandpile Creek Association is given.

LIARD RIV **PRELIMINARY**

Page 1 of 2

Soil Association SANDPILE CREEK

Plot Number 9023 - 80

Terrain Classification bgs F1

N. T. S. Sheet 94 M

Soil Moisture Subclass SUBHUMID

Soil Drainage WELL

Perviousness RAPIDLY

Free Water ABSENT

Flood Hazard MAY BE EXPECTED

Depth to: (cm.)
(- if absent)

a. water table	—
b. rooting (effective)	35
c. root restricting layer	35
d. frozen layer	—
e. bedrock	—
f. carbonate	35
g. salinity	—

Particle Size Analysis

Horizon Desig.	>2 mm %	<2 mm %	Sand %	Silt %	Clay %	Class
LFH						
Bf	17	83	56.7	33.9	9.4	Sl
BC						
Ck	63	37	70.4	22.7	6.9	Sl

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca (me/100g)	Exchangeable Mg (me/100g)	Exchangeable Na (me/100g)	Exchangeable K (me/100g)	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
LFH														
Bf	7.5	2.06	0.094	8.5	10.5	8.7	0.7	0.12	0.33	0.27	0.23	174		
BC														
Ck	7.1												1	60

PRELIMINARY

LIARD RIVE

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Soil Association SANDPILE CREEK

Plot Number 9-23-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5cm		Cobbles 7.5 - 25 cm		Stones >25cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
LFH	8-0	5	15	C	W																
Bf	0-17	10	20	G	I	75	25	R	50	R	25	R	gsl	W	M	SBK					
BC	17-35	10	18	C	W	75	25	R	50	R	25	R	gls			SGR					
Ck	35+					75	25	R	50	R	25	R	gls			SGR					

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles						Roots 1				Roots 2			
										Ab.	Si.	Co.		Colour	Bound. Dis.	Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast.	aspect		aspect		F C M	F M C	F D P	aspect		D C S C D	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
LFH																							
Bf	M		2	1	2	1	5 YR 4/4									A	F	O	MX				
BC	M		1	1	1	1	10 YR 4/4									P	F	O	MX	F	M	O	MX
Ck	M		1	1	1																		

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material				Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W M S	Kind 1	Kind 2	Decom N S M H	Hard S SH H VH	Vol. 0-1-2-3-4	Pyro. Index	von Post Scale			
LFH																						
Bf	P	F	R	EX	CO	D	I	M														
BC	P	F	R	MX	CO	D	I	H														
Ck												S										

PRELIMINARY

TA Turnagain Creek Association

Map Units of the Turnagain Creek Association

TA-R - This map unit consists of well drained, Eutric Brunisol soils, developed colluvial materials plus a significant portion of bedrock outcrops.
(Terrain Units: C/R, C//R)

TA-RA - A significant portion of this map unit is occupied by Range Association soils.
(Terrain Unit: C/M)

TA_1 - Soils of this map unit are shallow ($<$1 m) to deep ($>$1 m) and gullied, Eutric Brunisols, derived from colluvial materials.
(Terrain Units: C-V, Us-V, Cbv-V)

TA_1-R - Bedrock outcrops occupy a significant portion of this unit.
(Terrain Units: C-V/R, C-V//R, C/R-V)

TA_1-RA - Range Association soils occupy a significant portion of this map unit.
(Terrain Unit: C/M-V)

TA_2 - This map unit consists of well to rapidly drained, Eutric Brunisol soils developed in colluvial apron materials.
(Terrain Unit: Ca)

TA_3 - Shallow ($<$1 m) to deep ($>$1 m) colluvial deposits make up this unit.
(Terrain Unit: Cbv)

A profile description of an Eutric Brunisol of the Turnagain Creek Association is given.

PRELIMINARY

LIARD RIVL..

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Soil Association
TURNAGAIN CREEK

Plot Number
9021-80

Terrain Classification
gfCv

N.T.S. Sheet
94 M

Soil Moisture Subclass
SUBHUMID

Soil Drainage
WELL

Perviousness
RAPIDLY

Free Water
ABSENT

Flood Hazard
NO HAZARD

Depth to: (cm.)
(- if absent)

a. water table	–
b. rooting (effective)	35
c. root restricting layer	35
d. frozen layer	–
e. bedrock	–
f. carbonate	19
g. salinity	–

Particle Size Analysis

Horizon Desig.	>2 mm %	<2 mm %	Sand %	Silt %	Clay %	Class
Ah						
Bm	5	95	21.0	46.8	32.2	cl
BC						
Ck	47	53	36.6	43.3	20.1	l

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca	Exchangeable Mg (me/100g)	Exchangeable Na	Exchangeable K	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
Ah														
Bm	7.9	2.43	0.166	5.3	1.6	27.0	1.1	0.07	0.11	0.61	0.70	96		
BC														
Ck	7.6					24.0	1.0	0.13	0.06				1	120

LIARD RIV **PRELIMINARY**

Page 2 of 2

Soil Association TURNAGAIN CREEK

Plot Number 9021-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
AL	0-5	2	6	C	S	40	75	A	25	A			sil	W	F	GR					
Bm	5-10	4	12	C	1	40	75	A	25	A			gsicl	W	VFF	GR					
BC	10-18	0	13	C	1	40	75	A	25	A			gsicl	W	F	GR					
Ck	18-37+					75	75	A	25	A			gsil	WM	F	GR					

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles						Roots 1				Roots 2			
										Ab	Si	Co	Colour		Bound. Dis.	Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast.	aspect		aspect		F C M	F M C	F D P	aspect		D C S	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
AL	M		2	1	2	1	7.5 YR3/2									P	F	O	MX	F	C	H	MX
Bm	M		2	2	3	1	7.5YR 3/4									P	F	O	MX	F	C	H	MX
BC	M		2	2	2	1	10 YR 4/4									P	M	O	MX				
Ck	M		2	2	2	1	2.5Y 5/2									P	F	V	EX				

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material		Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W M S	Kind 1	Kind 2	Decom. N S M H	Hard. S SH H VH	Vol. 0-1-2-3-4					
AL	P	F	O	EX	CO	D	I	M														
Bm	P	M	O	EX	CO	D	I	M														
BC	P	F	O	MX	CO	D	I	M														
Ck	P	F	O	EX	CO	D	T	M				3										

PRELIMINARY

VA Valley Association

Map Units of the Valley Association

VA - This map unit consists of very poorly drained, Mesisol soils derived from organic deposits in the Kechika Ranges. (Terrain Unit: Obv)

7.3 SOILS OF THE LIARD PLAIN - NORTH SECTION

The features of the Liard Plain physiographic region are described in Chapter 2, Section 2.8 of this report. The north section is that area of the Liard Plain which is located north of the Red River, north and west of the Kechika River from its junction with the Red River and north of the Liard River from its junction with the Kechika River.

The soil parent materials of this region are primarily noncalcareous morainal, fluvial, glaciofluvial and minor eolian, lacustrine and colluvial deposits plus some bedrock outcrops.

The topography is generally flat to gently or strongly rolling.

Both the BWBS and SWB biogeoclimatic zones occur in this region. However, the SWB zone is minor, occurring primarily above 900 m elevation.

The soil associations which have been defined for this region include: the Angus Creek, Hyland River, Liard Tom Creek, Mayfield Creek, McNab Lake, Nancy Lake, Triangle Lake, Cosh Creek, Coal River, Lootz Creek and Siwash Creek assocations.

7.3.1 BWBS Zone

The following soil associations occur predominantly in the boreal white and black spruce biogeoclimatic zone: Angus Creek, Hyland River, Liard Tom Creek, Mayfield Creek, McNab Lake, Nancy Lake and Triangle Lake.

AN Angus Creek Association

Map Units of the Angus Creek Association

AN - Soils of this map unit consists of well to rapidly drained, Dystric Brunisol soils derived from colluvial materials.
(Terrain Unit: C)

AN-AN$_1$ - A significant portion of this unit is composed of soils derived from steep undifferentiated unconsolidated materials.
(Terrain Unit: C/Us)

AN-LI - The well drained, morainal derived, Dystric Brunisol soils of the Liard Tom Creek Assocation constitute a significant portion of this unit.
(Terrain Units: C/M-V, C = M)

AN-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: C/R, Cs/R, C/Rs)

AN-R-LI$_3$ - Bedrock outcrops and soils derived from shallow (<1 m) morainal deposits occupy significant portions of this map unit.
(Terrain Unit: C/R/Mv)

AN$_1$ - Soils of this unit are derived from deep ($>$1 m) colluvial and steep undifferentiated materials.
(Terrain Units: Us, Ca, Cb, Cs, Cbv)

AN$_2$ - Gullied colluvial soils make up this unit.
(Terrain Units: Us-V, C-V, Cs-V)

AN$_2$-AN - Non-gullied colluvial soils make up a significant portion of this map unit.
(Terrain Unit: Us-V/C)

AN$_2$-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Unit: C/R-V)

AN$_3$ - This map unit consists of all unconsolidated and consolidated materials which are in the process of failing.
(Terrain Units: Us-F, C-F, Ms-F, Ms-FV, ^{FG}ts-F, Rs-F, ^{FG}s, Mb-F)

AN$_4$ - This map unit is composed of soils derived from shallow ($<$1 m) colluvial materials which are often lithic.
(Terrain Unit: Cv)

AN$_4$-LI - Liard Tom Creek Association soils occupy a significant portion of this unit.
(Terrain Units: $\frac{Cv/M}{R}$, Cv/M)

AN$_4$-MA$_3$ - Mayfield Creek Association soils make up a significant portion of this unit.
(Terrain Unit: Cb/Ft)

AN$_4$-R - Bedrock outcrops occupy a minor portion of this map unit.
(Terrain Unit: Cba//R)

PRELIMINARY

AN_5 - This map unit consists of moderately well drained, Regosol soils, developed on landslide deposits.
(Terrain Units: Chr, Ch)

A profile description is not available for this association.

HY Hyland River Association

Map Units of the Hyland River Association

HY_1 - The soils of this map unit are well to rapidly drained, Dystric Brunisol soils, formed on glaciofluvial materials in subdued, ridged and hummocky topography.
(Terrain Units: $F^{G}hr$, $F^{G}h$, $F^{G}tr$, $F^{G}r$, $F^{G}ml$, $F^{G}m$, $F^{G}rh$, $F^{G}ht$, $\frac{F^{G}r}{Mb}$)

HY_1-MC - The Organic soils of the McNab Lake Association occupy a significant portion of this map unit.
(Terrain Units: $F^{G}hr//Obv$, $F^{G}h/Obv$, $F^{G}rt/Obv$)

HY_2 - This map unit consists of soils formed from level, terraced, steep and occasionally gullied glaciofluvial deposits.
(Terrain Units: $F^{G}t\text{-}V$, $F^{G}l$, $F^{G}ts$, $F^{G}s$, $gF^{G}s$, $F^{G}tm$, $F^{G}tb$, $F^{G}lt$, $F^{G}t$, $F^{G}b$, $\frac{F^{G}t}{R}$)

HY_2-HY_1 - This map unit is composed of soils formed on hummocky, ridged and terraced glaciofluvial materials.
(Terrain Units: $F^{G}t/F^{G}h$, $F^{G}t = F^{G}r$)

HY_2-LI_4 - This map unit contains a significant portion of soils of the Liard Tom Creek Association.
(Terrain Unit: $F^{G}t/Mh$)

HY_2-MA - The Mayfield Creek Association occupies a significant portion of this map unit.
(Terrain Units: $F^{G}l/Fl$, $F^{G}s = Fl$)

PRELIMINARY

HY_2-MA_3 - Mayfield Creek Association soils occupy a significant portion of this map unit. (Terrain Unit: F^Gt/Ft)

HY_2-MC - McNab Lake Association soils occupy a significant portion of this unit. (Terrain Units: F^Gl/Obv, $F^Glb = Ol$, F^Gt/Obv, $F^Gt//Obv$)

HY_2-NA_2 - The Nancy Lake Association soils derived from eolian materials occupy a large portion of this unit. (Terrain Unit: $F^Gt = \frac{\underline{Evr}}{F^Gt}$)

HY_3 - This map unit consists of soils derived from kettled glaciofluvial materials and they are well drained Dystric Brunisol or poorly drained, Gleysol soils. (Terrain Units: F^Gr-H, F^Gl-H, F^Gt-H, F^Gm-H, F^Gb-H, F^Gtr-H, F^Glt-H, F^Grh-H, F^Ghm-H, F^Gtm-HE^G, F^G-H)

HY_4 - Soils of this map unit are derived from glaciofluvial materials which are dissected by glacial meltwater channels. (Terrain Units: F^Gbr-E^G , F^Gl-E^G, F^Glt-E^G, F^Gtm-E^G, F^Gt-E^G)

HY_4-LI_2 - Liard Tom Creek Association soils dissected by meltwater channels occupy a major portion of this map unit. (Terrain Unit: F^Gb/M-E^G)

HY_5 - This map unit is composed of glaciofluvial soil parent materials which mantle other materials such as morainal deposits and bedrock. (Terrain Units: F^Gbv, F^Gb, F^Gfb, F^Gbm, F^Gbr, $\frac{F^Gb}{Mr}$, $\frac{F^Gb}{M}$, $\frac{F^Gbv}{M}$, $\frac{F^Gbrh}{M}$)

HY_5- MC - McNab Lake Association soils occupy a minor portion of this map unit.
(Corresponding Terrain Unit: $\frac{FG_v//Ob_v}{Mb}$)

HY_6 - Gullied glaciofluvial materials occupy this map unit.
(Terrain Unit: FG_{t-V})

HY_7 - Glaciofluvial fan deposits make up the soil parent materials of this map unit.
(Terrain Unit: FG_f)

A profile description of a Dystric Brunisol of the Hyland River Association is given.

PRELIMINARY

LIARD RIV

Soil Association

HYLAND RIVER

Plot Number

9030 - 80

Terrain Classification

gsF^{G}1

N. T. S. Sheet

94M

Soil Moisture Subclass

HUMID

Soil Drainage

RAPIDLY

Perviousness

RAPIDLY

Free Water

ABSENT

Flood Hazard

NO HAZARD

Depth to: (cm.)
(- if absent)

a. water table	—
b. rooting (effective)	>50
c. root restricting layer	—
d. frozen layer	—
e. bedrock	—
f. carbonate	—
g. salinity	—

Particle Size Analysis

Horizon Desig.	>2 mm %	<2 mm %	Sand %	Silt %	Clay %	Class
LFH						
Bm						
IIC						

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available		Exchangeable				Pyrophosphate			Se (ppm)	Hg (ppb)
				P (ppm)	S (ppm)	Ca	Mg (me/100g)	Na	K	Fe (%)	Al (%)	Mn (ppm)		
LFH														
Bm														
IIC														

LIARD RIV **PRELIMINARY**

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Soil Association HYLAND RIVER

Plot Number 9-30-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
LFH	6-0																				
Bm	0-20												sil								
IIC	20-50+					60	25	S	75	S			gs								

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles					Bound. Dis.	Roots 1				Roots 2			
										Ab.	Si.	Co.	Colour			Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast	aspect		aspect		F C M	F M C	F D P	aspect		D C S D	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
LFH																							
Bm																							
IIC																							

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material						
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W MS S	Kind 1	Kind 2	Decom. N S M H	Hard. S SH H VH	Vol. 0 1 2 3 4	Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
LFH																						
Bm																						
IIC																						

PRELIMINARY

LI Liard Tom Creek Association

Map Units of the Liard Tom Creek Association

LI - Soils of this map unit are well drained, Dystric Brunisol soils, developed from morainal materials which may be also gullied or occasionally beveled.
(Terrain Units: Mb-B, M, M-V, Mls, Ms, Ms-V, M-B, Msh, Mb-V, Mbv-V, Mm-V, Msb)

LI-AN - A significant portion of this map unit is occupied by Angus Creek Association soils.
(Terrain Units: M/C, Mv-V/C, M//C, Ms-V/C, M-V/C)

LI-AN-R - Angus Creek Association soils and bedrock outcrops occupy significant portions of this map unit.
(Terrain Unit: M = C/R)

LI-AN$_2$ - Gullied Angus Creek Associaion soils occupy a large portion of this map unit.
(Terrain Unit: M = C-V)

LI-HY$_1$ - Hyland River Association soils occupy a significant portion of this map unit.
(Terrain Unit: M/F^{G}_{h})

LI-MC - McNab Lake Association soils occupy a significant portion of this unit.
(Terrain Units: M/O, M/Obv, Ms//Obv, M = Obv)

LI-R - Bedrock outcrops occupy significant portions of this map unit.
(Terrain Units: Ms/R, M/R-V, M/R, Mbv/R-V, M//R)

LI$_1$ - Soils developed from a reasonably deep (>1 m) mantle of morainal material occupy this map unit.
(Terrain Units: Mb, Mbr, Mbm)

LI$_1$-AN - A significant portion of this unit is made up of Angus Creek Association soils.
(Terrain Unit: Mb/C)

LI$_1$-HY$_1$ - Hyland River Association soils make up a significant portion of this map unit.
(Terrain Units: Mb//$F^{G}r$, Mb/$F^{G}rb$)

LI$_1$-HY$_5$ - Blanketed Hyland River Association soils cover a significant portion of this unit.
(Terrain Units: Mb/$F^{G}b$, Mb//$F^{G}br$, Mb/$F^{G}br$, Mb//$F^{G}v$, Mb//$F^{G}b$, Mbm//$F^{G}bm$)

LI$_1$-MA$_4$ - Mayfield Creek Association soils derived from fluvial apron deposits occupy a significant portion of this map unit.
(Terrain Unit: Mb/Fa)

LI$_1$-MA$_4$-MC - Fluvial apron soils of the Mayfield Creek Association and McNab Association soils occupy significant portions of this map unit.
(Terrain Unit: Mb/Fa//Obv)

LI$_1$-MC - McNab Lake Association soils occupy a significant portion of this map unit.
(Terrain Units: Mbr/Ov, Mb/Obv, Mbr//Obv, Mb = Obv, Mbm//Obv)

LI$_2$ - Soils derived from morainal materials which are dissected by glacial meltwater channels make up this map unit.
(Terrain Units: Mb-E^{G}, Mbv-E^{G}, Mbr-E^{G}, Mm-E^{G}, M-E^{G}, Mb-E^{G}V, Mr-E^{G})

PRELIMINARY

LI_2-HY_5 - Hyland River Association soils occupy a significant portion of this map unit. (Terrain Units: $Mb\text{-}E^{G}//FG_{br}$, $Mm\text{-}E^{G}//FG_{b}$)

LI_2-HY_5-AN_4 - Hyland River and Angus Creek Associations soils occupy significant portions of this map unit. (Terrain Unit: $Mbv\text{-}E^{G}/FG_{b} = Cb$)

LI_2-MA_2 - Active floodplain soils of the Mayfield Creek Association occupy a large portion of this unit. (Terrain Unit: $M\text{-}E^{G}/FA_{1}$)

LI_3 - This map unit is composed of shallow (<1 m) morainal soils which are sometimes lithic. (Terrain Units: Mbv, Mvb, Mv, Mv/Mbv, (Mv = Mbv, Mvr, $\frac{Mv}{Rr}$)

LI_3-AN - Angus Creek Association soils occupy a significant portion of this map unit. (Terrain Units: Mbv/C, Mv/C, Mv//C)

LI_3-AN-R - Angus Creek Association soils and bedrock outcrops cover significant portions of this map unit. (Terrain Unit: Mv/C//R)

LI_3-HY_1 - Hyland River Association soils occupy a major portion of this unit. (Terrain Unit: Mbv/FG_{r})

LI_3-HY_5 - Blanketed Hyland River Association soils occupy a minor portion of this unit. (Terrain Unit: $Mbv//FG_{b}$)

LI$_3$-LI$_4$ - Drumlinized morainal deposits make up a large portion of this map unit.
(Terrain Unit: Mbv/Mr)

LI$_3$-MC - McNab Lake Association soils occupy a minor segment of this unit.
(Terrain Unit: Mbv//Obv)

LI$_3$-R - Bedrock outcrops occur in varying amounts throughout this map unit.
(Terrain Units: Mv/R, Mbv = R, Mbv/R, Mv//R, Mv/Rm, Mvr//R, Mvb/R)

LI$_4$ - This map unit is composed of soils developed on morainal material with subdued, drumlinized and occasionally hummocky topography.
(Terrain Units: Mr, Mm, Mmr, Mmb, Mh, Mm = Mh, Mh = Mm, Mm//Mr, Mr = Mm)

LI$_4$-HY$_1$ - Ridged Hyland River Association soils occupy a minor portion of this unit.
(Terrain Unit: Mr//FG$_r$)

LI$_4$-HY$_5$ - Blanketed Hyland River Association soils occupy a major portion of this map unit.
(Terrain Units; Mm = FG$_{bm}$, Mm/FG$_b$, Mm/FG$_t$)

LI$_4$-LI$_2$ - Blanketed morainal soils cover a minor segment of this unit.
(Terrain Unit: Mr//Mb)

LI$_4$-LI$_3$ - Soils formed from shallow (<1 m) morainal deposits occupy a large portion of this map unit.
(Terrain Units: Mr/Mbv, Mr/Mv)

LI$_4$-MA$_1$ - Level Mayfield Creek Association soils cover a significant portion of this map unit.
(Terrain Units: Mr/Fl, Mm/Fl)

LI$_4$-MA$_4$ - Fluvial apron soils of the Mayfield Creek Association occupy a significant segment of this unit.
(Terrain Units: Mr/Fa)

LI$_4$-MA$_4$-MC - Fluvial apron soils of the Mayfield Creek Association and McNab Lake Association soils occupy significant portions of this map unit.
(Terrain Unit: Mr/Fa = Obv)

LI$_4$-MC - McNab Lake Association soils occupy a significant portion of this unit.
(Terrain Units: Mh/Obv, Mh = Obv, Mm/Obv, Mr//Obv, Mmr//Obv)

LI$_5$ - This map unit consists of soils formed from morainal materials that are kettled.
(Terrain Unit: Mm-H)

LI$_5$-HY$_3$ - Kettled Hyland River Association soils occupy a large portion of this unit.
(Terrain Unit: Mm/F^{G}_{-H})

LI$_6$ - This map unit consists of morainal deposits which have been sorted by wave action to form beaches. The resultant soils are well to rapidly drained, Humo-Ferric Podzol soils.
(Terrain Unit: Mb-W)

LI$_6$-HY$_1$ - Ridged Hyland River Association soils occupy a minor segment of this map unit.
(Terrain Unit: Mb-W//F^{G}_{r})

A profile description for a Dystric Brunisol soil of the Liard Tom Creek Association is given.

PRELIMINARY

LIARD RIV

Page 1 of 2

Soil Association
LIARD TOM CREEK

Plot Number
9016-80

Terrain Classification
$g\frac{fMI}{R}$

N. T. S. Sheet
105A

Soil Moisture Subclass
SUBHUMID

Soil Drainage
WELL

Perviousness
RAPIDLY

Free Water
ABSENT

Flood Hazard
NO HAZARD

Depth to: (cm.)
(- if absent)

a. water table	—
b. rooting (effective)	25
c. root restricting layer	36
d. frozen layer	—
e. bedrock	—
f. carbonate	—
g. salinity	—

Particle Size Analysis

Horizon Desig.	>2mm %	<2mm %	Sand %	Silt %	Clay %	Class
LF						
Ae						
Bfj		100	20.9	68.6	10.5	SiL
Bm	21	79	45.5	47.2	7.3	L-SL
BC						
C	24	76	65.7	28.2	6.1	SL

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca (me/100g)	Exchangeable Mg (me/100g)	Exchangeable Na (me/100g)	Exchangeable K (me/100g)	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
LF														
Ae														
Bfj	5.8	0.97	0.059	9.6	<.1	5.0	1.0	0.11	0.20	0.38	0.33	17		
Bm	5.8	0.53	0.033	7.5	0.4	3.8	0.8	0.11	0.15	0.31	0.34	21		
BC														
C	5.1												2	60

LIARD RIV

PRELIMINARY

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Soil Association LIARD TOM CREEK

Plot Number 9016-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5 cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod	Grade	Class	Kind	Kind Mod
LF	8-0	5	9	C	W																
Ae	0-4	2	5	G	W								sl	W	F	GR					
Bfj	4-13	0	8	G	I	50	60	S	35	S	5	S	sil	WM	M	SBK					
Bm	13-25	10	15	G	W	50	60	S	35	S	5	S	gsil	WM	M	SBK					
BC	25-36	13	16	N	S	50	60	S	35	S	5	S	gsil	WM	M	SBK					
C	36-45+					50	60	S	35	S	5	S	gsil	M	MC	SBK					

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles					Bound. Dis.	Roots 1				Roots 2			
										Ab	Si.	Co.	Colour			Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast.	aspect		aspect		F C M	F M C	F D P	aspect		D C S D	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
LF																							
Ae	D	2	2	2	1	2	10YR 6/3									P	M	H	MX	V	C	H	MX
Bfj	M		3	2	3	1	7.5YR 4/6									F	M	O	MX				
Bm	M		3	2	2	1	2.5Y 6/6									V	C	V	MX				
BC	M		3	2	2	1	2.5Y 6/6																
C	M		3	2	3	1	2.5Y 4/4																

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material		Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W M S	Kind 1	Kind 2	Decom. N S M H	Hard. S SH H VH	Vol. 0-1-2-3-4					
LF																						
Ae	A	F	R	EX	CO	D	V	H														
Bfj	F	F	O	EX	CO	D	T	M														
Bm	V	V	R	EX	DC	D	I	S														
BC	F	V	R	EX	DC	D	I	S														
C	F	F	R	EX	DC	D	I	S														

PRELIMINARY

MA Mayfield Creek Association

Map Units of the Mayfield Creek Association

MA - This map unit consists of well drained, Humo-Ferric Podzol soils developed on a mantle of fluvial materials overlying other materials.
(Terrain Units: Fbv, Fv)

$MA-LI_3$ - Mantled Liard Tom Creek Association soils occupy a major portion of this map unit.
(Terrain Unit: Fv = Mbv)

MA_1 - This map unit consists of well drained, Humo-Ferric Podzol soils developed on level fluvial deposits.
(Terrain Units: Fl, Flf, Flt)

MA_1-LI - Liard Tom Creek Association soils occupy a large portion of this map unit.
(Terrain Unit: Fl/Ms-V)

MA_1-MA_2 - Active floodplain soils constitute a large portion of this unit.
(Terrain Unit: $Fl/F^{A}l$)

MA_2 - These soils have developed on actively forming fluvial deposits and are well to poorly drained, Regosol or Gleysol soils.
(Terrain Units: $gF^{A}l$, $F^{A}l$, $F^{A}f$, $F^{A}lt$)

MA_2-MA_1 - A major portion of this map unit consists of inactive fluvial deposits.
(Terrain Units: $F^{A}l/Fl$, $F^{A}l//Fl$, $F^{A}l$ = Fl)

MA_2-MC - McNab Lake Association soils occupy a significant portion of this map unit.
(Terrain Unit: $FA_1 = Obv$)

MA_3 - This map unit is composed of soils developed from terraced and occasionally level, steep or fan-shaped fluvial deposits.
(Terrain Units: Ft, gFt, Ftl, Fs, Ftf, $\frac{Ft}{R}$)

MA_3-MA_2 - A significant portion of this map unit is occupied by active floodplain deposits.
(Terrain Unit: Ft/FA_1)

MA_3-MA_4 - This map unit is composed of fluvial terrace and apron soils.
(Terrain Units: Ft = Fa, Ft/Fa)

MA_3-MC - McNab Lake Association soils occupy a significant portion of this map unit.
(Terrain Unit: Ft/Obv)

MA_4 - This map unit consists of soils developed on fluvial fan and apron deposits.
(Terrain Units: Ff, Fa, $\frac{Fa}{Mb}$)

MA_4-HY_2 - A significant portion of this map unit consists of terraced Hyland River Association soils.
(Terrain Unit: Fa/FG_t)

MA_4-LI_4 - Liard Tom Creek Association soils occupy a large portion of this map unit.
(Terrain Unit: Fa/Mm)

MA_4-MC - McNab Lake Association soils occupy a significant portion of this unit.
(Terrain Units: Fa = Obv, Fa/Obv, Fa//Obv, Ff/O)

MA$_5$ - The soils of this map unit are dissected by relic stream channels.
(Terrain Units: Fl-E, Ftl-E, Ft-E)

MA$_5$-MA$_2$-MC - Significant portions of this unit are occupied by active floodplain deposits and McNab Lake Association soils.
(Terrain Unit: Ft-E/FA$_1$ = Obv)

MA$_5$-MC - McNab Lake Association soils occupy a major portion of this map unit, particularly the relic stream channels.
(Terrain Unit: Fl-E = Obv)

MA$_6$ - This map unit is composed of fluvial deposits which are dissected by active stream channels.
(Terrain Unit: Fl-EA)

A profile description of a Humo-Ferric Podzol soil of the Mayfield Creek Association is given.

PRELIMINARY

LIARD RIVER SOILS

Page 1 of 2

Soil Association MAYFIELD CREEK

Plot Number 9017-80

Terrain Classification g^{F+}

N.T.S. Sheet 105A

Soil Moisture Subclass SUBHUMID

Soil Drainage RAPIDLY

Perviousness RAPIDLY

Free Water ABSENT

Flood Hazard NO HAZARD

Depth to: (cm.)
(- if absent)

a. water table –
b. rooting (effective) > 38
c. root restricting layer > 38
d. frozen layer –
e. bedrock –
f. carbonate –
g. salinity –

Particle Size Analysis

Horizon Desig.	>2 mm %	<2 mm %	Sand %	Silt %	Clay %	Class
LF						
Bf	20	80	52.3	39.7	8.0	l -sl
Bm						
C	70	30	94.3	4.2	1.5	S

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca (me/100g)	Exchangeable Mg (me/100g)	Exchangeable Na (me/100g)	Exchangeable K (me/100g)	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
LF														
Bf	5.4	1.07	0.064	8.3	0.3	2.5	0.5	0.08	0.11	0.33	0.26	64		
Bm														
C	5.7					1.0	0.1	0.12	0.06				2	140

LIARD RIV **PRELIMINARY**

Page 2 of 2

Soil Association MAYFIELD CREEK

Plot Number 7617-P6

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
LF	9-0	5	10	C	S																
Bf	0-10	6	11	G	S								l	WM	F	SBK					
Bm	10-18	6	8	G	S								gls	W	M	GR					
C	18-38+					75	70	R	30	R			gs			SGR					

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles					Bound. Dis.	Roots 1				Roots 2			
										Ab.	Si.	Co.	Colour			Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast.	aspect		aspect		F C M	F M C	F D P	aspect		D C S C D	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
LF																							
Bf	M		2	2	2	1	5YR 4/6									P	F	H	MX				
Bm	M		1	1	1	1	10YR 4/6									P	F	O	MX				
C	M		1	1	1											F	V	V	MX				

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material		Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W M S	Kind 1	Kind 2	Decom. N S M H	Hard. S SH H VH	Vol. 0 1 2 3 4					
LF																						
Bf	P	F	O	EX	CO	D	T	M														
Bm	P	F	R	EX	CO	D	I	H														
C	P	F	R	MX	CO	D	I	H														

MC McNab Lake Association

Map Units of the McNab Lake Association

MC - This map unit is composed of poorly drained, Mesisol soils, derived from organic deposits. (Terrain Units: Obv, Ov, $\frac{\text{Obv}}{\text{Fl}}$, $\frac{\text{Ov}}{\text{Mm}}$, Ov/Ft)

MC-HY$_1$ - Ridged Hyland River Association soils occupy a minor portion of this unit. (Terrain Unit: Obv//$F^{G}{}_{r}$)

MC-HY$_5$ - Mantled Hyland River Association soils occupy a significant portion of this unit. (Terrain Unit: Obv/$F^{G}{}_{b}$)

MC-LI - Liard Tom Creek Association soils occupy a large portion of this map unit. (Terrain Units: Obv/M, Obv/Ms, Ov/M)

MC-LI$_4$ - Drumlinized or subdued Liard Tom Creek Association soils occupy a significant portion of this unit. (Terrain Units: Ovb/Mr, Obv//Mr, Obv/Mm, Obv = Mm)

MC-MA$_1$ - Level fluvial soils of the Mayfield Creek Association occupy a significant portion of this map unit. (Terrain Units: Obv/Fl, Obv/Flt, Obv/Flf, Obv = Fl)

MC-MA$_2$ - Active floodplain deposits of the Mayfield Creek Association occupy a significant portion of this map unit. (Terrain Units: Obv/$F^{A}{}_{1}$, Obv = $F^{A}{}_{1}$)

PRELIMINARY

$MC\text{-}MA_3$ - Soils formed on fluvial terrace deposits of the Mayfield Creek Association occupy a major portion of this unit. (Terrain Unit: Obv = Ft)

$MC\text{-}MA_4$ - Fluvial fan deposits of the Mayfield Creek Association occupy a significant portion of this map unit. (Terrain Units: Obv/Fa, Obv/Ff, Obv//Ff)

A profile description of a Mesisol soil of the McNab Lake Association is given.

PRELIMINARY

LIARD RIVE..

Soil Association MCNAB LAKE

Plot Number 9020-80

Terrain Classification fO^{B}_{b}

N. T. S. Sheet 104P

Soil Moisture Subclass SUBHUMID

Soil Drainage POORLY

Perviousness SLOWLY

Free Water PRESENT

Flood Hazard MAY BE EXPECTED

Depth to: (cm.)
(- if absent)

a. water table 60
b. rooting (effective) 20
c. root restricting layer —
d. frozen layer —
e. bedrock —
f. carbonate —
g. salinity —

Particle Size Analysis

Horizon Desig.	>2mm %	<2mm %	Sand %	Silt %	Clay %	Class
Of						
Of + Om						
Om		100				-

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca	Exchangeable Mg (me/100g)	Exchangeable Na	Exchangeable K	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
Of														
Of +Om														
Om	4·7	53·46	1·606	15·2	60·8	37·5	17·0	0·65	0·12					

LIARD RIV

PRELIMINARY

Page 2 of 2

Soil Association MCNAB LAKE

Plot Number 7-20-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
Of	0-20																				
Of+Om	20-40																				
Om	40-60+																				
* PROBED TO >120 cm AND STILL ORGANIC AT THAT DEPTH																					

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles					Bound. Dis.	Roots 1				Roots 2			
										Ab.	Si.	Co.	Colour			Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast.	aspect		aspect		F C M	F M C	F D P	aspect		C G S D	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
Of																							
Of+Om																							
Om																							

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.		Woody Material			Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
													Kind 1	Kind 2	Decom.	Hard.	Vol.					
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W M S			N S M H	S SH H VH	0 1 2 3 4					
Of													3		S	SH	1	1	02			
Of+Om*																						
Om													3		M	S	1	1	06	86	59	5
* LAYERS ALTERNATE - APPROX. 2 cm THICK EACH																						

PRELIMINARY

NA Nancy Lake Association

Map Units of the Nancy Lake Association

NA_1 - This map unit consists of well drained, Humo-Ferric Podzol soils, developed from shallow (<1 m) eolian material overlying terraced and kettled fluvial deposits. (Terrain Units: $\frac{sEbv}{F^{G}t}$, $\frac{sEbv}{gF^{G}t\text{-}H}$)

NA_2 - This map unit consists of well drained, Humo-Ferric Podzol soils developed from sand dune deposits usually overlying terraced glaciofluvial deposits. (Terrain Units: $\frac{sEr}{F^{G}}$, $\frac{sEr}{F^{G}t}$, Evr)

A profile description of a Humo-Ferric Podzol of the Nancy Lake Association is given.

LIARD RIVE PRELIMINARY

Page 1 of 2

Soil Association NANCY LAKE

Plot Number 9019-80

Terrain Classification sEb

N.T.S. Sheet 104P

Soil Moisture Subclass SUBHUMID

Soil Drainage WELL

Perviousness RAPIDLY

Free Water ABSENT

Flood Hazard NO HAZARD

Depth to: (cm.)
(- if absent)

a. water table —
b. rooting (effective) 60
c. root restricting layer —
d. frozen layer —
e. bedrock —
f. carbonate —
g. salinity —

Particle Size Analysis

Horizon Desig.	>2mm %	<2mm %	Sand %	Silt %	Clay %	Class
LFH						
Ae						
Bf		100	68.2	28.9	2.9	sl
Bm		100	55.5	40.1	4.4	sl
BC						
C		100	97.6	1.4	1.0	S

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available		Exchangeable				Pyrophosphate			Se (ppm)	Hg (ppb)
				P (ppm)	S (ppm)	Ca	Mg (me/100g)	Na	K	Fe (%)	Al (%)	Mn (ppm)		
LFH														
Ae														
Bf	5.9	0.65	0.039	197.2	0.4	1.1	0.2	0.11	0.15	0.18	0.23	90		
Bm	6.0	0.35	0.030	110.0	<.1	1.4	0.4	0.12	0.19	0.20	0.26	12		
BC														
C	6.2													
													1	1300

LIARD RIVI

PRELIMINARY

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Soil Association NANCY LAKE

Plot Number 9017-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm Min.	Horizon Thickness cm Max.	Horizon Boundary Dist.	Horizon Boundary Form	Coarse Fragment Descript. % by vol.	Gravel <7.5 cm %	Gravel Type	Cobbles 7.5 - 25 cm %	Cobbles Type	Stones >25 cm %	Stones Type	Soil Texture < 2mm	Structure Primary Grade	Primary Class	Primary Kind	Primary Kind Mod.	Secondary Grade	Secondary Class	Secondary Kind	Secondary Kind Mod.
LFH	1-0	0	2	C	S																
Ae	TRACE																				
Bf	0-7	4	12	C	I								sl	W	M	PL					
Bm	7-16	5	11	C	W								sl	W	M	SBK					
BC	16-32	13	20	G	S						-	-	ls			SGR					
C	32-60+												ls			SGR					

Horizon Desig.	Mst. D M W	Consist. dry	moist	wet	plast	Colour 1 aspect	Colour 1	Colour 2 aspect	Colour 2	Mottles Ab. F C M	Si. F M C	Co. F D P	Colour aspect	Colour	Bound. Dis. D C S D	Roots 1 Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX	Roots 2 Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX
LFH																							
Ae																							
Bf	M		2	1	2	1	7.5YR4/4									P	M	H	MX				
Bm	M		2	2	2	1	7.5YR5/6									F	F	O	MX	F	M	H	MX
BC	M		2	1	1	1	2.5Y 5/6									F	F	O	MX				
C	M		1	1	1	1	2.5Y 5/4									V	F	O	MX				

Horizon Desig.	Pores Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX	Cont. CO DC	Mor. S D C	Type V I T	Hor. Por. S M H	Clay Films Freq. F C M CS	Thi. TN MTK TK VTK	Loc. 0 to 8	Effer. Deg. VW W M S	Organic Material Description Material Composit. Kind 1	Kind 2	Decom. N S M H	Woody Material Hard. S SH H VH	Vol. 0-1-2-3-4	Pyro. Index	von Post Scale	Fiber Analysis Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
LFH																						
Ae																						
Bf	P	F	R	MX	CO	D	I	H														
Bm	P	F	R	EX	CO	D	I	H														
BC	P	F	R	MX	CO	D	I	H														
C	P	F	R	MX	CO	D	I	H														

PRELIMINARY

TR Triangle Lake Association

Map Units of the Triangle Lake Association

TR - This map unit is composed of moderately-well drained, Gray Luvisol soils developed on gullied, lacustrine terrace deposits. (Terrain Unit: Lt-V)

A profile description for the Triangle Lake Association is not available.

7.3.2. SWB Zone

The following soil associations occur predominantly in the spruce-willow-birch biogeoclimatic zone: Cosh Creek, Coal River, Lootz Creek, and Siwash Creek Associations.

CC Cosh Creek Association

Map Units of the Cosh Creek Association

CC - This map unit is composed of well to moderately well drained, Dystric Brunisol soils developed on morainal materials which are frequently gullied.
(Terrain Units: M, Mbv-V, M-V, Ms-V)

CC-CR - Coal River Association soils occupy a significant portion of this map unit.
(Terrain Units: M/C, M//C, M-V/C)

CC-CR-R - Coal River Association soils and bedrock outcrops occupy significant portions of this map unit.
(Terrain Units: M = C//R, Mv/C//R, M = C/R)

CC-R - Bedrock outcrops occupy a large portion of this unit.
(Terrain Unit: Mbv/R-V)

CC-R-CR - Bedrock outcrops and Coal River Association soils occupy significant portions of this map unit.
(Terrain Unit: Mv/R/C)

CC_1 - This map unit is composed of shallow (1 m) morainal deposits overlying bedrock where the soils are frequently lithic.
(Terrain Units: Mbv, Mv)

CC_1-CC_2 - Drumlinized morainal deposits make up a large portion of this unit.
(Terrain Unit: Mbv/Mr)

CC_1-CR - Coal River Association soils occupy a large portion of this map unit.
(Terrain Units: Mv/C, Mbv/C)

CC_1-R - Bedrock outcrops occupy a significant portion of this unit.
(Terrain Units: Mv/R, Mbv//R)

CC_1-SW_1 - Siwash Creek Association soils occupy a large portion of this map unit.
(Terrain Unit: Mbv/F^{G}_{h})

CC_2 - This map unit is composed of soils developed on drumlinized and hummocky morainal deposits.
(Terrain Units: Mr, Mh)

CC_2-CC_1 - Drumlinized and shallow (<1 m) morainal deposits form the parent materials for soils in this map unit.
(Terrain Unit: Mr/Mbv)

CC_3 - Mantled and drumlinized morainal deposits constitute the parent materials for the soils of this unit.
(Terrain Units: Mb, Mbr)

CC_4 - This map unit is composed of soils developed in morainal materials which are dissected by glacial meltwater channels.
(Terrain Units: M-E^{G}, Mbv-E^{G})

CC_5 - Soils of this map unit have developed on morainal materials which are actively failing.
(Terrain Unit: Mb-F)

A profile description of a Dystric Brunisol soil of the Cosh Creek Association is given.

LIARD RIVE PRELIMINARY

Page 1 of 2

Soil Association

COSH CREEK

Plot Number

9018-80

Terrain Classification

gfMb

N. T. S. Sheet

105A

Soil Moisture Subclass

SUBHUMID

Soil Drainage

WELL

Perviousness

RAPIDLY

Free Water

ABSENT

Flood Hazard

NO HAZARD

Depth to: (cm.)
(- if absent)

- a. water table —
- b. rooting (effective) 35
- c. root restricting layer 25
- d. frozen layer —
- e. bedrock —
- f. carbonate —
- g. salinity —

Particle Size Analysis

Horizon Desig.	>2 mm %	<2mm %	Sand %	Silt %	Clay %	Class
LF						
Bm	30	70	57.9	42.0	6.1	sl
BC						
C	40	60	62.3	31.0	6.7	sl

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available		Exchangeable				Pyrophosphate			Se (ppm)	Hg (ppb)
				P (ppm)	S (ppm)	Ca	Mg (me/100g)	Na	K	Fe (%)	Al (%)	Mn (ppm)		
LF														
Bm	5.1	1.25	0.060	185.6	1.8	0.9	0.1	0.13	0.15	0.29	0.34	244		
BC														
C	5.0													
													2	1300

LIARD RIV **PRELIMINARY**

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Soil Association COSH CREEK

Plot Number 9018-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm Min.	Max.	Horizon Boundary Dist.	Form	Coarse Fragment Descript. % by vol.	Gravel <7.5 cm %	Type	Cobbles 7.5 - 25 cm %	Type	Stones >25 cm %	Type	Soil Texture < 2mm	Structure Primary Grade	Class	Kind	Kind Mod.	Secondary Grade	Class	Kind	Kind Mod.
LF	7-0	6	9	C	W																
Bm	0-17	10	15	G	W	50	80	S	20	S			gl	W	FM	SBK					
BC	17-25	13	16	D	S	50	80	S	20	S			gl	M	M	SBK					
C	25-34+					50	80	S	20	S			gl			MA		M	M	SBK	

Horizon Desig.	Mst. D M W	Consist. dry	moist	wet	plast.	Colour 1 aspect	Colour 1	Colour 2 aspect	Colour 2	Mottles Ab. F C M	Si. F M C	Co. F D P	Colour aspect	Colour	Bound. Dis.	Roots 1 Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX	Roots 2 Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX
LF																							
Bm	M		2	2	1	1	7.5 YR 5/6									F	F	O	MX	F	C	H	MX
BC	M		2	2	2	1	10 YR 6/4									F	F	O	MX				
C	M		2	2	2	1	10 YR 7/4									V	M	V	MX				

Horizon Desig.	Pores Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX	Cont. CO DC	Mor. S D C	Type V I T	Hor. Por. S M H	Clay Films Freq. F C M CS	Thi. TN MTK TK VTK	Loc. 0 to 8	Effer. Deg. VW W MS	Organic Material Description Material Composit. Kind 1	Kind 2	Decom. N S M H	Woody Material Hard. S SH H VH	Vol. 0-1-2-3-4	Pyro. Index	von Post Scale	Fiber Analysis Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
LF																						
Bm	P	F	R	MX	CO	D	I	M														
BC	P	F	R	MX	CO	D	I	S														
C	P	V	R	MX	CO	D	I	S														

CR Coal River Association

Map Units of the Coal River Association

CR - This map unit is composed of well to rapidly drained, Dystric Brunisol soils developed on colluvial materials which are usually gullied and often steep.
(Terrain Units: C-V, Cs-V)

CR-CC - Cosh Creek Association soils occupy a large portion of this map unit.
(Terrain Units: C-V/M, C/M-V)

CR-R - Bedrock outcrops occupy a large portion of this unit.
(Terrain Units: C/R, C/R-V)

CR-R-CC - Bedrock outcrops and Cosh Creek Association soils occupy significant portions of this map unit.
(Terrain Unit: C/R/Mv)

CR_1 - Soils of this map unit have developed in colluvial apron deposits.
(Terrain Unit: Ca)

CR_2 - Soils of this unit have developed in colluvial deposits which are actively failing.
(Terrain Unit: C/R-VF)

A profile description of a Coal River Association soil is not available.

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6. any monies advanced by the Property Manager, its nominee or guarantor pursuant to the terms of the Negative Cash Flow Loan administered with the Property Management Agreement must be re-paid to the Property Manager, its nominee or guarantor on the fifth anniversary of the date of registration of the first mortgage of the Unit subscribed for herein at the Land Title Office, Victoria, British Columbia;

7. my individual beneficial interest in the Project cannot, prior to the deposit of the Project strata plan with the Registrar of Land Titles in Victoria, British Columbia, be sold, conveyed, transferred, assigned, hypothecated, fractionalized or otherwise disposed of, and that any attempt to do so will, as against third parties with or without notice, be void, and, at the option of Wille Sipos Enterprises Ltd., my subscription will be cancelled and the Promissory Notes and cash equity payments paid to and received by Wille Sipos Enterprises Ltd. shall, together with mortgage application(s), be returned to me forthwith at the address set forth in this Subscription Form.

I, the undersigned, hereby declare that at the time of the execution hereof:

(a) if an individual, acknowledge that:

- (i) as of December 30, 1980, my net worth is at least $250,000.00 exclusive of home, car, and furnishings; or
- (ii) as of December 31, 1980, my net worth is at least $50,000.00 exclusive of home, car, and furnishings and my taxable income for the 1980 taxation year, except for tax shelter investments, would have placed me in the 50% or higher tax bracket; and
- (iii) by virtue of my investment experience; or
- (iv) by virtue of my consultation with or advice from the dealer or Stan Sipos;

I am in a position to evaluate the prospective investment on the basis of the Offering Memorandum and such other information that has been presented to me.

(b) if a corporation, acknowledge that:

- (i) the Officers and Directors are in a position to evaluate the prospective investment on the basis of the Offering Memorandum and other information that has been presented to them:

SW Siwash Creek Association

Map Units of the Siwash Creek Association

SW_1 - This map unit is composed of well drained, Humo-Ferric Podzol soils developed on ridged and/or hummocky glaciofluvial deposits.
(Terrain Units: FG_r, FG_h)

A profile description of a Siwash Creek Association soil is not available.

LC Lootz Creek Association

Map Units of the Lootz Creek Association

LC - This map unit is composed of very poorly drained, Fibrisol soils developed from organic materials.
(Terrain Units: Ob, Ov)

LC-CC_1 - Subdued morainal deposits of the Cosh Creek Association occupy a large portion of this map unit.
(Terrain Unit: Obv/Mm)

A profile description of the Lootz Creek Association soils is not available.

7.4 SOILS OF THE LIARD PLAIN - SOUTH SECTION

The features of the Liard Plain region are described in Chapter 2, Section 2.8 of this report. The south section of this region is that portion lying south of the Red River, south and east of the Kechika from its confluence with the Red River and south of the Liard River from its confluence with the Kechika River.

The soil parent materials of this region are mostly morainal, colluvial, fluvial and glaciofluvial with minor areas of lacustrine and organic materials and some bedrock outcrops. These soil parent materials are predominantly calcareous due to the influence of glacial materials derived from bedrock materials of the Kechika Ranges.

The topography is very gently to strongly rolling except where incised by the major rivers.

Both the boreal white and black spruce and the spruce-willow-birch biogeoclimatic zones occur within this region.

The soil associations defined for this region include: the Birches Lake, Davie Creek, Gemini Lakes, Hare Lake, Kechika River, Red River, Aeroplane Lake, Fishing Creek, Graveyard Lake and Niloil Lake associations.

7.4.1 BWBS Zone

Those soil associations occurring within the boreal white and black spruce biogeoclimatic zone include: Birches Lake, Davie Creek, Gemini Lakes, Hare Lake, Kechika River and Red River associations.

BR Birches Lake Association

Map Units of the Birches Lake Association

BR_1 - This map unit is composed of moderately well drained, Gray Luvisol soils which have developed on lacustrine terrace deposits. (Terrain Unit: Lt)

BR_2 - The soils of this map unit have developed from gullied lacustrine terrace deposits. (Terrain Unit: Lt-V)

A profile description of a Birches Lake Association soil is not available.

DC Davie Creek Association

Map Units of the Davie Creek Association

DC - This map unit is composed of rapidly drained, Regosol soils derived from colluvial and undifferentiated unconsolidated materials which are often steep.
(Terrain Units: C, Cs, US)

DC-HL - Hare Lake Association soils occupy a significant portion of this map unit.
(Terrain Unit: C/M)

DC-HL-KR_4 - Hare Lake Association and level Kechika River Association soils occupy significant portions of this map unit.
(Terrain Unit: C/M//Fl)

DC-R - Bedrock outcrops occupy a significant portion of this unit.
(Terrain Units: C//R, C/R)

DC_1 - The soils of this map unit are derived from gullied colluvial and undifferentiated deposits.
(Terrain Units: C-V, U-V, Us-V)

DC_1-R - Bedrock outcrops occupy a large portion of this map unit.
(Terrain Unit: C/Rs-V)

DC_2 - The soils of this map unit are formed from deep ($>$1 m) mantled and apron colluvial deposits.
(Terrain Units: Cbv, Cb, Ca)

DC_3 - This map unit encompasses soils derived from relic landslide deposits.
(Terrain Unit: Cm)

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DC_4 - Soils of this unit are derived from
undifferentiated unconsolidated materials
which are actively failing.
(Terrain Units: U-F, Us-F)

A profile description of a Davie Creek Association soil is not available.

GE Gemini Lakes Association

Map Units of the Gemini Lakes Association

GE - This map unit consists of very poorly drained, Mesisol soils developed from organic accumulations in depressional areas.
(Terrain Units: Obv, $\frac{\text{Ov}}{\text{Ft}}$, $\frac{\text{Obv}}{\text{Fl}}$, $\frac{\text{Ov}}{\text{Fa}}$)

GE-HL$_3$ - A major portion of this map unit is occupied by subdued morainal soils of the Hare Lake Association.
(Terrain Unit: Obv = Mm)

GE-KR$_3$ - Soils formed on the active floodplain deposits of the Kechika River Association occupy a large portion of this map unit.
(Terrain Unit: Obv/FA$_1$)

GE-KR$_4$ - Kechika River Association soils formed from level fluvial deposits occupy a significant portion of this map unit.
(Terrain Unit: Dbv/Fl, Obv//Fl)

GE-KR$_5$ - Fluvial apron deposits form a minor portion of the soil parent materials of this map unit.
(Terrain Unit: Obv//Fa)

A profile description of a Gemini Lakes Association soil is not available.

HL Hare Lake Association

Map Units of the Hare Lake Association

HL - This map unit is composed of well to moderately well drained, Eutric Brunisol soils developed on morainal deposits which are often steep.
(Terrain Units: $\frac{\text{Ms}}{\text{R}}$, M, Ms)

HL-KR$_4$ - Level fluvial deposits of the Kechika River Association occupy a minor portion of this map unit.
(Terrain Unit: Ms//Fl)

HL$_1$ - This map unit consists of shallow (<1 m) to deep (>1 m) soils derived from mantled morainal deposits. These soils are occasionally lithic.
(Terrain Unit: Mbv)

HL$_1$-DC - Davie Creek Association soils occupy a minor portion of this unit.
(Terrain Unit: Mbv//C)

HL$_1$-GE - Gemini Lakes Association soils occupy a minor portion of this map unit.
(Terrain Unit: Mbv//Obv)

HL$_1$-HL$_3$ - Soils formed on drumlinized morainal deposits occupy a large segment of this map unit.
(Terrain Units: Mbv/Mr, Mbv//Mr)

HL$_2$ - Shallow morainal soils overlying bedrock form the soil parent materials in this map unit.
(Terrain Units: Mv, $\frac{\text{Mv}}{\text{Rr}}$)

HL_2-DC - Davie Creek Association soils occupy a significant portion of this map unit. (Terrain Units: Mv/C, Mv//C)

HL_2-R - Bedrock outcrops occupy significant portions of this map unit. (Terrain Units: Mv//R, Mv = R, Mv/Rm)

HL_3 - Soils of this map unit are developed on ridged, hummocky and subdued morainal deposits. (Terrain Units: Mr, Mm, Mh)

HL_3-GE - Gemini Lakes Association soils occupy a significant portion of this map unit. (Terrain Units: Mr//Obv, Mm/Obv, Mm = Obv, Mh/Obv)

HL_3-HL_1 - Mantled morainal deposits occupy a minor portion of this map unit. (Terrain Unit: Mr//Mbv)

HL_3-RR - Terraced Red River Association soils occupy a major portion of this unit. (Terrain Unit: Mm = FG_t)

HL_3-RR_3 - Ridged Red River Association soils occupy a major portion of this map unit. (Terrain Unit: Mm = FG_r)

HL_4 - Soils of this map unit have formed from deep ($>$1 m) mantled morainal deposits. (Terrain Units: Mb, Mbr)

HL_4-GE - Gemini Lakes Association soils occupy a significant portion of this map unit. (Terrain Unit: Mbr/Obv, Mb//Obv)

HL_4-KR_5 - Fluvial apron deposits of the Kechika River Association occupy a minor portion of this map unit.
(Terrain Unit: Mb//Fa)

HL_4-KR_6 - Mantled fluvial deposits of the Kechika River Association occupy a minor portion of this unit.
(Terrain Unit: Mb//Fb)

HL_4-RR_2 - Mantled glaciofluvial deposits of the Red River Association occupy a minor portion of this map unit.
(Terrain Unit: Mb//F^G_b)

HL_4-RR_3 - Ridged Red River Association soils occupy a large portion of this map unit.
(Terrain Unit: Mb/F^G_r)

HL_5 - This map unit is composed of soils developed on morainal materials which are dissected by glacial meltwater channels.
(Terrain Units: Mb-E^G, Mbr-E^G, M-E^G, Mbs-E^G)

HL_5-DC - Davie Creek Association soils occupy a large portion of this unit.
(Terrain Units: Mb-VE^G/C)

HL_5-GE - Gemini Lakes Association soils occupy a minor portion of this unit.
(Terrain Units: Mb-E^G//Obv)

HL_5-R - Bedrock outcrops occupy a minor portion of this map unit.
(Terrain Unit: Mbr//Rr-E^G)

HL_5-RR_2 - Mantled glaciofluvial deposits of the Red River Association occupy a minor portion of this map unit.
(Terrain Unit: Mb-E^G//F^G_b)

HL_6 - Soils of this map unit are formed in gullied morainal deposits.
(Terrain Units: Mb-V, M-V)

HL_6-GE - Gemini Lakes Association soils occupy a large portion of this map unit.
(Terrain Unit: M-V/Ov)

HL_7 - Soils of this map unit have developed on morainal deposits which have been levelled by glacial action.
(Terrain Units: Mb-BV, Mb-B)

A profile description of a Hare Lake Association soil is not available.

KR Kechika River Association

Map Units of the Kechika River Association

KR$_1$ - This map unit is composed of well drained, Eutric Brunisol soils developed on terraced and sometimes steep fluvial deposits. (Terrain Units: Ft, $\frac{Ft}{R}$, $\frac{gFs}{Ls}$)

KR$_1$-KR$_3$ - Imperfectly to poorly drained, Regosol or Gleysol soils developed on active floodplain deposits. (Terrain Units: Ft//F$^{A}_{1}$, Ft/F$^{A}_{1}$)

KR$_2$ - The soils of this map unit are dissected by active stream channels. (Terrain Unit: Fl-E^{A})

KR$_3$ - Soils of this map unit consist of imperfectly to poorly drained, Regosol or Gleysol soils developed on active floodplain deposits. (Terrain Units: F$^{A}_{1}$, gF$^{A}_{1}$)

KR$_3$-KR$_1$ - Terraced fluvial deposits occupy a major portion of this map unit. (Terrain Unit: F$^{A}_{1}$ = Ft)

KR$_3$-KR$_4$ - Level fluvial deposits occupy a large portion of this unit. (Terrain Unit: F$^{A}_{1}$/Fl)

KR$_4$ - This map unit consists of soils formed from level fluvial deposits. (Terrain Unit: Fl, Flt)

KR$_4$-DC$_2$ - Aproned Davis Creek Association soils occupy a major portion of this unit. (Terrain Unit: Fl = Ca)

KR$_4$-GE - Gemini Lakes Association soils occupy a major portion of this map unit.
(Terrain Unit: Fl=Obv)

KR$_4$-KR$_3$ - Active floodplain deposits occupy a large portion of this map unit.
(Terrain Unit: Fl/FA$_1$)

KR$_5$ - Soils of this map unit are derived from fluvial apron and fan deposits.
(Terrain Units: Fa, Ft, Fft, $\frac{Fa}{FG_t}$)

KR$_5$-GE - Gemini Lakes Association soils occupy a significant portion of this map unit.
(Terrain Units: Ff/Obv, Fa/Obv, Fa//Obv, Fa/Ob)

KR$_5$-KR$_1$ - Fluvial apron and terrace deposits form the soil parent materials of this map unit.
(Terrain Unit: Fa = Ft)

KR$_6$ - A mantle ($>$1 m) of fluvial material forms the soil parent material of this map unit.
(Terrain Unit: Fb)

KR$_7$ - Soils of this unit are dissected by relic stream channels.
(Terrain Units: Ft-E, Flt-E)

A profile description of a Kechika River Association soil is not available.

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RR Red River Association

Map Units of the Red River Association

RR$_1$ - This map unit is composed of well to rapidly drained, Eutric Brunisol soils developed on terraced, level and occasionally blanketed, steep, subdued or ridged glaciofluvial deposits.
(Terrain Units: ^{FG}t, ^{FG}tb, ^{FG}l, ^{FG}tm, ^{FG}ts, ^{FG}s, ^{FG}tr)

RR$_1$-HL - Hare Lake Association soils occupy a minor portion of this map unit.
(Terrain Unit: $^{FG}l//M$)

RR$_2$ - Soils of this map unit have developed from shallow ($<$1 m) mantled glaciofluvial deposits overlying morainal deposits.
(Terrain Units: ^{FG}b, $\frac{^{FG}v}{Ml}$, $\frac{^{FG}v}{M}$, $\frac{^{FG}v}{Mm}$)

RR$_3$ - The soils of this map unit have developed from hummocky, ridged, subdued and fan-shaped glaciofluvial deposits.
(Terrain Units: ^{FG}m, ^{FG}hr, ^{FG}r, ^{FG}h, ^{FG}f)

RR$_3$-GE - Gemini Lakes Association soils occupy a significant portion of this map unit.
(Terrain Units: ^{FG}r = Obv, $^{FG}hr//Obv$)

RR$_3$-KR$_3$ - Active floodplain deposits occupy a minor portion of this map unit.
(Terrain Unit: $^{FG}h//^{F}A_1$)

RR$_4$ - Soils of this map unit have developed in kettled glaciofluvial materials.
(Terrain Units: ^{FG}t-H, ^{FG}b-H, ^{FG}l-H)

RR_5 - The soils of this map unit are dissected by glacial meltwater channels. (Terrain Unit: $FG_1-{}_EG$)

RR_6 - Soils of this map unit have developed on glaciofluvial deposits overlying lacustrine deposits all of which are actively failing. (Terrain Unit: $\frac{gFG_s}{sLs} - F$)

A profile description of a Red River Association soil is not available.

PRELIMINARY

7.4.2 SWB Zone

The soil associations occurring in the spruce-willow-birch biogeoclimatic zone include: Aeroplane Lake, Fishing Creek, Graveyard Lake and Niloil Lake associations.

AE Aeroplane Lake Association

Map Units of the Aeroplane Lake Association

AE - This map unit is composed of very poorly drained, Mesisol soils derived from organic accumulations.
(Terrain Unit: Obv)

A profile description of an Aeroplane Lake Association soil is not available.

FC Fishing Creek Association

Map Units of the Fishing Creek Association

FC$_1$ - This map unit is composed of well drained, Eutric Brunisol soils, developed in fluvial apron deposits.
(Terrain Unit: Fa)

FC$_1$-AE - Aeroplane Lake Association soils occupy a significant portion of this unit.
(Terrain Units: Fa//Obv, Fa/Obv)

A profile description of a Fishing Creek Association soil is not available.

PRELIMINARY

GL Graveyard Lake Association

Map Units of the Graveyard Lake Association

GL - This map unit is composed of well drained, Eutric Brunisol soils derived from colluvial materials.
(Terrain Unit: C)

GL-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: C/R, C//R)

$GL-NL_4$ - Shallow (<1 m) Niloil Lake Association soils occupy a minor portion of this map unit.
(Terrain Unit: C//Mv)

GL_1 - Soils of this map unit have developed gullied colluvial materials.
(Terrain Unit: C-V)

A profile description of the Graveyard Lake Association soils is not available.

PRELIMINARY

NL Niloil Lake Association

Map Units of the Niloil Lake Association

NL_1 - This map unit is composed of well to imperfectly drained, Eutric Brunisol or Gray Luvisol soils, developed from shallow ($<$ 1 m) to deep ($>$ 1 m) mantled morainal materials.
(Terrain Unit: Mbv)

NL_1-GL - Graveyard Lake Association soils occupy a large portion of this map unit.
(Terrain Unit: Mbv/C)

NL_1-NL_2 - Drumlinized morainal materials occupy a significant portion of this map unit.
(Terrain Units: Mbv/Mr, Mbv//Mr)

NL_2 - The soils of this map unit have developed on drumlinized morainal materials.
(Terrain Unit: Mr)

NL_2-NL_1 - Mantled morainal deposits make up a significant portion of this map unit.
(Terrain Unit: Mr/Mbv, Mr//Mbv)

NL_3 - Soils of this map unit are dissected by glacial meltwater channels and may be also gullied.
(Terrain Units: M-E^G, Mb-VE^G)

NL_3-GL - Graveyard Lake Association soils occupy a large portion of this map unit.
(Terrain Unit: Mb-VE^G/C)

NL_4 - This map unit is composed of soils derived from shallow ($<$ 1 m) mantled morainal deposits.
(Terrain Units: Mv)

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NL_4-R - Bedrock outcrops occupy significant portions of this map unit.
(Terrain Units: Mv/R, Mv//R)

NL_5 - Soils of this map unit have developed from deep (>1 m) mantled and subdued morainal deposits.
(Terrain Units: Mb, Mbm)

NL_6 - Subdued morainal deposits are the soil parent materials for this map unit.
(Terrain Unit: Mm)

A profile description of a Niloil Lake Association soil is not available.

PRELIMINARY

7.5 SOILS OF THE LIARD PLATEAU

Features of the Liard Plateau are described in Chapter 2, Section 2.6 of this report.

Soil parent materials found in this region are primarily morainal and colluvial with minor amounts of lacustrine organic, glacio fluvial, and fluvial materials and some bedrock outcrops.

The topography is moderately to strongly rolling and occasionally steep, particularly where incised by major streams.

The boreal white and black spruce and spruce-willow-birch biogeoclimatic zones both occur in this region although the SWB zone dominates.

Soil associations defined for this region include: the Deer River, Grayling River, Graybank Creek, Jane Smith Creek, Mould Creek, Teeter Creek, Chalford Creek, Moule Creek and Mt. Halkett associations.

7.5.1 BWBS Zone

Those soil associations which occur most commonly in the boreal white and black spruce biogeoclimatic zone include: the Deer River, Grayling River, Graybank Creek, Jane Smith Creek, Mould Creek and Teeter Creek associations.

DE Deer River Association

Map Units of the Deer River Association

DE - This map unit is composed of very poorly drained, Mesisol soils developed from organic accumulations.
(Terrain Unit: Obv)

DE-GA$_1$ - Mantled Grayling River Association soils occupy a significant portion of this map unit.
(Terrain Units: Ova/Mb, Ova = Mb, Ov/Mb, Ov = Mb)

DE-GA$_1$-JS$_5$ - Mantled Grayling River Association and shallow (<1 m) Jane Smith Creek Association soils occupy significant portions of this unit.
(Terrain Unit: Ov = Mb//Cv)

DE-GA$_2$ - Shallow (<1 m) to deep (>1 m) mantled Grayling River Association soils occupy a significant portion of this map unit.
(Terrain Units: Ov = Mbv, Ov/Mbv)

DE-GC - Soils of the Graybank Creek Association occupy a large portion of this unit.
(Terrain Unit: Ov/Lb)

$DE-TE_2$ - Level fluvial deposits of the Teeter Creek Association occupy a significant portion of this map unit.
(Terrain Unit: Obv/Fl)

$DE-TE_3$ - Soils derived from fluvial fan deposits of the Teeter Creek Association occupy a significant portion of this map unit.
(Terrain Units: Obv/$\frac{Ov}{Fa}$//Ff, Ovb/Ffl)

$DE-JS_1$ - Shallow (<1 m) and sometimes fan-shaped Jane Smith Creek Association soils occupy a significant portion of this map unit.
(Terrain Unit: Ova/Cvf)

DE_1 - The soils of this map unit are Cryosol soils in which permafrost is encountered within 1 m of the surface.
(Terrain Unit: Ova-X)

A profile description of a Deer River Association soil is not available.

GA Grayling River Association

Map Units of the Grayling River Association

GA - This map unit is composed of well to moderately well drained, Eutric Brunisol soils developed on morainal deposits which often are steep and overlie bedrock.
(Terrain Units: Ms, $\frac{M}{R}$)

GA-JS$_1$ - Apron shaped Jane Smith Creek Association soils occupy large portions of this map unit.
(Terrain Unit: M/Ca)

GA$_1$-DE - Deer River Association soils occupy a significant portion of this map unit.
(Terrain Units: Mb/Ov, Mb//Ov,Mbr//Ov)

GA$_1$-JS - Jane Smith Creek Association soils occupy a significant portion of this map unit.
(Terrain Unit: Mb = C, Mb/C, Mb//C)

GA$_1$-JS$_1$ - Apron shaped Jane Smith Creek Association soils occupy a large portion of this unit.
(Terrain Unit: Mb/Ca)

GA$_1$-R-DE - Bedrock outcrops and Deer River Association soils occupy significant portions of this map unit.
(Terrain Units: Mbv//R = Ov, Mbv/R = Ov)

GA$_2$ - This map unit consists of shallow (<1 m) and deep (>1 m) soils, developed from morainal materials.
(Terrain Units: Mbv, Mvr, Mv/Mb)

GA_2-DE - Deer River Association soils occupy a significant portion of this map unit.
(Terrain Units: Mbv = Ov, Mbv/Ov, Mbm/Ov)

GA_2-DE-R - Deer River Association soils and bedrock outcrops occupy significant portions of this map unit.
(Terrain Unit: Mbv/Ov/R)

GA_2-JS - Jane Smith Creek Association soils occupy a minor portion of this map unit.
(Terrain Unit: Mbv//C)

GA_2-JS-R - Jane Smith Creek Association soils and bedrock outcrops occupy significant portions of this map unit.
(Terrain Unit: Mvb/C/R)

GA_2-JS_5 - Shallow (<1 m) Jane Smith Creek Association soils occupy significant portions of this map unit.
(Terrain Units: Mbv//Cv, Mbv/Cv, Mbv = C, Mbv = Cv plus Mvb/Cv)

GA_2-JS_5-DE - Shallow (<1 m) Jane Smith Creek Association and Deer River Association soils occupy significant portions of this unit.
(Terrain Unit: Mbv//Cv-Ov)

GA_2-JS_5-R - Shallow (<1 m) Jane Smith Creek Association soils and bedrock outcrops occupy significant portions of this map unit.
(Terrain Unit: Mbv/Cv//R)

GA_2-R - Bedrock outcrops occupy significant portions of this map unit.
(Terrain Units: Mvr=R, Mv/R, Mv//R, Mvb/Rr, Mbv//R)

GA$_3$ - This map unit consists of soils developed from shallow (<1 m) morainal deposits. These soils are frequently lithic. (Terrain Units: $\frac{\text{Mv}}{\text{R}}$, Mvb, Mv)

GA$_3$-DE - Deer River Association soils occupy a large portion of this map unit. (Terrain Unit: Mv/Ov)

GA$_3$-DE-R - Deer River Association soils and bedrock outcrops occupy significant portions of this map unit. (Terrain Unit: Mvb/Ov = R)

GA$_3$-JS - Jane Smith Creek Association soils occupy a significant portion of this unit. (Terrain Units: Mv = C, Mv/C)

GA$_3$-JS$_5$ - Shallow Jane Smith Creek Association soils occupy a significant portion of this map unit. (Terrain Units: Mv/Cv, Mvb/Cv, Mv//Cv, Mvb//CV)

GA$_3$-JS$_5$-DE - Shallow (<1 m) Jane Smith Creek Association and Deer River Association soils occupy significant portions of this map unit. (Terrain Unit: Mvb/Cv = Ov)

GA$_3$-JS$_5$-R - Shallow (<1 m) Jane Smith Creek Association soils and bedrock outcrops occupy significant portions of this unit. (Terrain Units: Mv = Cva/R, Mv/Cv/R, Mvb = Cv/R, Mvb//Cv = R, Mv = Cv/R, Mv = Cv//R)

GA$_3$-R - Bedrock outcrops occupy a significant portion of this map unit. (Terrain Units: Mv = Rm, Mv = R, Mv//R, Mv/R, Mvb//R, Mvb/R)

GA_3-R-JS_5 - Bedrock outcrops and shallow (<1 m) Jane Smith Creek Association soils occupy significant portions of this unit. (Terrain Units: Mv/R = Cv, Mv/R/Cv, Mv/R = Cva, Mvb/Rr = Cvb)

GA_4 - Soils of this map unit have formed in gullied morainal deposits. (Terrain Units: Ms-V, Mbv-V)

GA_4-JS_4 - Gullied Jane Smith Creek Association soils occupy a large portion of this map unit. (Terrain Unit: Mvb/Cf-V)

GA_4-JS_4-R - Gullied Jane Smith Creek Association soils and bedrock outcrops occupy significant portions of this map unit. (Terrain Unit: Mv = Cv/R-V)

GA_5 - The soils of this map unit are dissected by glacial meltwater channels. (Terrain Units: Mv-E^G, Mb-E^G)

GA_6 - Soils of this map unit have developed in deep morainal deposits on subdued or ridged topography. (Terrain Units: Mm, Mr)

A profile description of a Grayling River Association soil is not available.

GC Graybank Creek Association

Map Units of the Graybank Creek Association

GC - This map unit is composed of moderately well drained, Gray Luvisol soils developed on lacustrine blanket deposits.
(Terrain Unit: Lb)

GC-DE - Deer River Association soils occupy a a significant portion of this unit.
(Terrain Units: Lb/Ova, Lb/Ov, Lb = Ov)

A profile description of a Graybank Creek Association soil is not available.

JS Jane Smith Creek Association

Map Units of the Jane Smith Creek Association

JS - This map unit consists of well to rapidly drained, Dystric Brunisol soils derived from colluvial materials which are frequently inactive.
(Terrain Units: C, CI)

JS-GA - Grayling River Association soils occupy a large portion of this map unit.
(Terrain Unit: C/R)

JS-R - Bedrock outcrops occupy a large portion of this map unit.
(Terrain Unit: C/R)

JS_1 - This map unit is composed of deep (>1 m) soils developed on colluvial fan and/or apron materials.
(Terrain Units: Ca, Cf, Cfv, Cav, Cfa, Cfb)

JS_1-DE - Deer River Association soils occupy a significant portion of this map unit.
(Terrain Units: Cfa/Ov, Cfa//Ov)

JS_1-GA_1 - Blanketed Grayling River Association soils occupy a large part of this map unit.
(Terrain Unit: Ca/Mb)

JS_1-R - Bedrock outcrops occupy a minor part of this map unit.
(Terrain Unit: Cab//Rs)

JS_1-R-GA_1 - Bedrock outcrops and shallow (<1 m) Grayling River Association soils occupy significant portions of this map unit.
(Terrain Unit: Cfv/R/Mv)

JS$_1$-TE$_1$ - Terraced Teeter Creek Association soils occupy a large part of this unit. (Terrain Unit: Ca/Ft)

JS$_1$-TE$_2$ - Level Teeter Creek Association soils occupy a significant portion of this map unit. (Terrain Units: Cav/Fl, Cfv/Fl, Cf//Fl)

JS$_1$-TE$_3$ - Aproned Teeter Creek Association soils occupy a major portion of this unit. (Terrain Unit: Ca = Fa)

JS$_2$ - Soils of this map unit are derived from deep (>1 m) mantled colluvial deposits overlying bedrock or occasionally fluvial materials.
(Terrain Units: Cba, Cbv, Cbr, Cbm, Cbf, Cb, Cbh, $\frac{\text{Cbv}}{\text{Ft}}$)

JS$_2$-DE-TE$_3$ - Deer River Association soils and fan shaped Teeter Creek Association soils occupy minor portions of this map unit. (Terrain Unit: Cbv//Ov = Ff)

JS$_2$-GA - Deep (>1 m) mantled morainal materials form the soil parent materials of a major portion of this map unit.
(Terrain Units: Cb = Mb, Cbv/Mbv, Cbv = Mbv)

JS$_2$-GA$_3$ - Shallow (<1 m) mantled morainal materials form the soil parent materials of a significant portion of this map unit.
(Terrain Units: Cbv/Mv)

JS$_2$-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: Cbv/R, Cbm//R, Cbv//Rs, Crb//R, Cbv//R)

JS_2-TE_1 - Terraced Teeter Creek Association soils occupy a large portion of this map unit.
(Terrain Unit: Cb/Ft)

JS_2-TE_2 - Level Teeter Creek Association soils occupy a large portion of this unit.
(Terrain Unit: Cb/Fl)

JS_3 - Soils of this map unit have developed in fine textured landslide deposits and are Regosol (Turbic phase).
(Terrain Units: Ch, Crh, Cm, Cr, Chr)

JS_3-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: Ch/R, Cm//R, Cmv//R)

JS_4 - Gullied colluvial deposits form the soil parent materials of this map unit.
(Terrain Units: Cv-V, Ca-V, Cvf-V, Cva-V)

JS_4-GA_4 - Gullied Grayling River Association soils occupy a significant portion of this unit.
(Terrain Units: C = Ms-V, Cvm//Mv-V, Ca/Mb-V)

JS_4-GA_4-R - Gullied Grayling River Association soils and bedrock outcrops occupy a large portion of this map unit.
(Terrain Unit: Cv = Mvb//R-V)

JS_4-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: C-V/R, Cb//R-V, Cv = Rs-V, Cv/Rs-V, Cv//Rs-V, Cva//Rs-V, Cv//R-V, Cvb/Rs-V)

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JS_5 - The soils of this map unit have developed on shallow (<1 m) colluvial materials overlying bedrock and are often lithic.
(Terrain Units: Cvs, Cvf, Cvb, Cv, Cva)

JS_5-DE - Deer River Association soils occupy a significant portion of this map unit.
(Terrain Units: Cv//Ov, Cva//Ov, Cv/Ov)

JS_5-GA_1 - Blanketed (>1 m) Grayling River Association soils occupy a major portion of this unit.
(Terrain Unit: Cvb = Mb)

JS_5-GA_2 - Shallow (<1 m) and deep (>1 m) Grayling River Association soils occupy a large portion of this map unit.
(Terrain Unit: Cva/Mbv)

JS_5-GA_3 - Shallow (<1 m) Grayling River Association soils occupy a significant portion of this map unit.
(Terrain Units: Cv = Mv, Cvb/Mvb, Cv/Mv, Cv/Mvb, Cv = Mvb)

JS_5-GA_3-DE - Shallow (<1 m) Grayling River Association and Deer River Association soils occupy significant portions of this map unit.
(Terrain Units: Cv/Mv/Ov, Cv/Mv = Ov, Cv-Mv//Ov, Cv = Mv//Ov)

JS_5-GA_3-R - Shallow (<1 m) Grayling River Association soils and bedrock outcrops occupy significant portions of this map unit.
(Terrain Units: Cv/Mv/R, Cv = Mv/R)

JS_5-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: Cv//R, Cva/Rs, Cva//R, Cv/Rs, Cvb//R, Cvb/Rs, Cvb//Rs, Cv = Rs, Cv/R)

JS$_5$-TE$_2$-DE - Level Teeter Creek Association and Deer River Association soils occupy significant portions of this map.
(Terrain Unit: Cv = Fl/Ov)

JS$_5$-TE$_3$ - Fan shaped Teeter Creek Association soils cover a large portion of this unit.
(Terrain Unit: Cv/Ff)

JS$_6$ - Soils of this map unit have developed on colluvial deposits which are subject to rapid mass wasting.
(Terrain Unit: Cv-R)

JS$_6$-GA$_7$ - Grayling River Association soils, which are also subject to rapid mass wasting, occupy a large portion of this map unit.
(Terrain Unit: Cv/Mv-R)

JS$_6$-GA$_7$-R$_3$ - Grayling River Association soils and bedrock outcrops, both of which are also subject to rapid mass wasting, occupy significant portions of this map unit.
(Terrain Unit: Cv/Mv/R-R)

JS$_6$-R$_3$ - Bedrock outcrops, subject to rapid mass wasting, occupy a minor portion of this map unit.
(Terrain Unit: Cva//Rs-R)

JS$_7$-R$_7$ - This map unit consists of soils formed from colluvial deposits plus bedrock outcrops, all of which have been failing but are presently inactive.
(Terrain Units: Cvb/Rmr-F^I, Crm//R-F^I, Cv/Rs-F^I, Cbv//R-F^I)

JS_8-R_9 - The soils of this map unit have developed from colluvial deposits plus bedrock outcrops which are gullied and/or subject to rapid mass wasting.
(Terrain Units: Cvf = R-RV, Cv/Rs-R, Cv/Rs-VR, Cvb//R-R, Cb/Rs-R, Cvb/Rs-RV)

JS_8-R_9-TE_8 - The Jane Smith Creek Association soils, bedrock outcrops and Teeter Creek Association soils of this map unit are all subject to rapid mass wasting and gullying.
(Terrain Unit: Cvb//Rs = Fs-RV)

JS_9-R_4 - This map unit consists of Jane Smith Creek Association soils and bedrock outcrops which are failing and subject to rapid mass wasting.
(Terrain Units: Cbv//Rs-FR, Cvb/Rs-RF)

JS_{10} - This map unit is failing and gullied.
(Terrain Unit: Cbr-FV)

JS_{10}-R_1 - The Jane Smith Creek Association soils and the bedrock outcrops of this map unit are failing. These units occur primarily along the Scatter River and the Grayling River.
(Terrain Units: Cvf//Rs-F, Cm = Rs-F, Ch//Rs-F, Cvb/Rs-F, Cmv//Rs-F)

JS_{11}-R_8 - This map unit consists of Jane Smith Creek Association soils and bedrock outcrops which are failing, gullied, and subject to rapid mass wasting. These units occur in the vicinity of the Scatter and Grayling rivers and along the Liard River as well.
(Terrain Units: Cvb/Rs-FRV, Cvm/Rs-FVR)

JS_{12}-R_6 - The Jane Smith Association soils and the bedrock outcrops of this map unit are gullied and failing.
(Terrain Units: Cvb/Rs-FV, Cvb//Rs-FV, Cmv = Rs-FV, Cbm/Rs-FV, Cbm/Rs-FV, Cbv/Rs-VF)

JS_{12}-R_6-GA_8 - The soils and bedrock outcrops of this map unit are gullied and failing.
(Terrain Unit: Crh//Rs = $\frac{Mv}{R}$-FV)

A profile description of a Jane Smith Creek Association soil is not available.

MD Mould Creek Association

Map Units of the Mould Creek Association

MD - The soils of this map unit are well to moderately well drained, Eutric Brunisol or Gray Luvisol soils developed from glaciofluvial materials.
(Terrain Unit: ^{FG}b)

MD_1 - The soils of this unit are developed on terraced, level and steep glaciofluvial deposits.
(Terrain Units: ^{FG}t, ^{FG}tm, ^{FG}l, ^{FG}s, ^{FG}tr)

MD_1-DE - Deer River Association soils occupy a significant portion of this map unit.
(Terrain Units: $^{FG}t//Ov$, $^{FG}ts//Ov$, $^{FG}l/Ov$)

MD_2 - This map unit consists of gullied glaciofluvial terrace deposits.
(Terrain Unit: $^{FG}t\text{-}V$)

MD_2-TE_3 - Teeter Creek Association fan and terraced soils occupy a large portion of this map unit.
(Terrain Unit: $^{FG}t/Fft$)

MD_3 - This map unit is composed of soils developed on glaciofluvial fan deposits.
(Terrain Unit: ^{FG}f)

MD_4 - Soils formed on blanketed, ridged, hummocky and subdued glaciofluvial deposits occupy this map unit.
(Terrain Units: ^{FG}rv, ^{FG}br, ^{FG}bm, ^{FG}rh)

MD_5 - Kettled glaciofluvial deposits form the soil parent materials of this map unit. (Terrain Units: ^{FG}f-H, ^{FG}rh-H, ^{FG}l-H)

A profile description of a Gray Luvisol soil of the Mould Creek Association is given.

LIARD RIVI PRELIMINARY

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Soil Association
MOULD CREEK

Plot Number
9CC5 - 8C

Terrain Classification
$\frac{fFv}{gF^{G}l}$

N. T. S. Sheet
94N

Soil Moisture Subclass
SUBHUMID

Soil Drainage
WELL

Perviousness
MODERATELY

Free Water
ABSENT

Flood Hazard
NO HAZARD

Depth to: (cm.)
(- if absent)

a. water table	—
b. rooting (effective)	34
c. root restricting layer	34
d. frozen layer	—
e. bedrock	—
f. carbonate	
g. salinity	—

Particle Size Analysis

Horizon Desig.	>2mm %	<2mm %	Sand %	Silt %	Clay %	Class
LF						
H						
Ae						
Bm		100	22.0	68.1	9.9	SiL
AB						
IIBt	60	40	54.6	24.0	21.4	SCL
IIC	65	35	65.9	22.4	11.7	SL

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca (me/100g)	Exchangeable Mg (me/100g)	Exchangeable Na (me/100g)	Exchangeable K (me/100g)	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
LF														
H														
Ae														
Bm	5.8	0.57	0.049	5.1	1.0	3.9	1.1	0.13	0.11	0.34	0.28	73		
AB														
IIBt	7.2					9.8	3.3	0.15	0.18					
IIC	8.0												2	110

LIARD RIV **PRELIMINARY**

Page 2 of 2

Soil Association MO[illegible]D CREEK

Plot Number 9005-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
LF	9-3	4	7	G	S								f								
H	3-0	2	5	C	S								h								
Ae	0-1	0	2	D	B																
Bm	1-17	13	17	D	W								sl			MA					
AB	17-24	14	16	A	W								sl			MA					
IIBt	34-47	14	16	C	I	65	25	R	60	R	15	R	gsl	W	C	SBK					
IIC	47-55+					65	25	R	60	R	15	R	gs			SBK					

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles					Bound. Dis.	Roots 1				Roots 2			
										Ab.	Si.	Co.	Colour			Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast.	aspect		aspect		F C M	F M C	F D P	aspect		D C S D	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
LF																A	M	H	MX				
H	M					1	10YR 2/1									P	M	H	MX				
Ae																							
Bm	M		2	1	1	1	7.5YR 4/4									P	M	H	MX				
AB	M		2	1	1	1	10YR 4/4									F	F	O	MX				
IIBt	M		2	2	2	1	10YR 4/4									P	F	O	MX				
IIC	M	1	1	1	1											F	M	O	MX				

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material		Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W M S	Kind 1	Kind 2	Decom. N S M H	Hard. S SH H VH	Vol. 0-1-2-3-4					
LF	A	M	H	MX	CO	D	I	M					6		S	SH	2	1	03			
H	A	F	O	MX	CO	D	I	M					6		H	S	1	1	08			
Ae																						
Bm	F	F	R	MX	CO	D	I	M														
AB	F	V	R	MX	CO	D	I	M														
IIBt	P	F	R	EX	CO	D	I	M	F	TN	1											
IIC	P	M	R	MX	CO	D	I	H														

TE Teeter Creek Association

Map Units of the Teeter Creek Association

TE - This map unit consists of well to poorly drained, Regosol or Gleysol soils developed on fluvial deposits.
(Terrain Units: Ffl/Ft, Ft = Ffl, Fl/Ftf)

TE-JS$_1$ - Fan shaped Jane Smith Creek Association soils occupy a large portion of this map unit.
(Terrain Unit: Ff = Cfv//Ft)

TE$_1$ - Soils of this map unit are well drained, Regosol soils formed on terraced and steep fluvial deposits.
(Terrain Units: Ft, Fs, Ftf, $\frac{Ft}{R}$, $\frac{Fs}{R}$)

TE$_1$-DE - Deer River Association soils occupy a significant portion of this map unit.
(Terrain Units: Ft//Ov, Ft//Fl = Ov)

TE$_2$ - Level fluvial deposits form the soil parent materials of this map unit.
(Terrain Units: Fl, Flt, Flf)

TE$_2$-DE - Deer River Association soils occupy a significant portion of this map unit.
(Terrain Units: Fl/Ov, Fl//Ov)

TE$_2$-JS$_1$ - Fan shaped Jane Smith Creek Association soils occupy a minor portion of this map unit.
(Terrain Unit: Flf//Cf)

TE$_3$ - Fluvial fan and apron deposits are the soil parent materials in this map unit.
(Terrain Units: Ff, Fa, Fft, $F^{A}f$)

TE$_3$-DE - Deer River Association soils occupy a minor portion of this map unit.
(Terrain Unit: Fa//Obv)

TE$_4$ - This map unit contains soils developed on active floodplain deposits which are imperfectly to poorly drained Regosol or Gleysol soils.
(Terrain Unit: F^{A}_{1})

TE$_4$-DE - Deer River Association soils occupy a major portion of this map unit.
(Terrain Unit: F^{A}_{1}//Obv)

TE$_4$-GA$_4$ - Gullied Grayling River Association soils occupy a major portion of this map unit.
(Terrain Unit: F^{A}_{1} = M-V)

TE$_5$ - The soils of this map unit are dissected by active stream channels.
(Terrain Units: F^{A}_{1}-E^{A}, Fl-E^{A}, Ft//Fl-E^{A}, Ft = Fl-E^{A}, Ftl-E^{A})

TE$_5$-DE - Deer River Association soils occupy a large portion of this map unit.
(Terrain Unit: Ftl = Ov//Flf-E^{A})

TE$_6$ - Mantled ($>$1 m) fluvial deposits form the soil parent materials of this map unit.
(Terrain Units: Fba, $\frac{\text{Fbv}}{\text{R}}$)

TE$_6$-GA$_1$ - Deep ($>$1 m) Grayling River Association soils occupy a large portion of this map unit.
(Terrain Unit: Fba/Mb)

TE_7 - The soils of this map unit are dissected by relic stream channels which contain poorly drained Gleysol soils.
(Terrain Unit: Flt-E)

TE_7-DE - Deer River Association soils occupy a minor portion of this unit.
(Terrain Unit: Ft//Ov-E)

A profile description of a Regosol soil of the Teeter Creek Association is given.

PRELIMINARY

LIARD RIVER SOILS

Page 1 of 2

Soil Association TEETER CREEK

Plot Number 9033-20

Terrain Classification F1

N. T. S. Sheet 94 M

Soil Moisture Subclass HUMID

Soil Drainage WELL

Perviousness RAPIDLY

Free Water ABSENT

Flood Hazard MAY BE EXPECTED

Depth to: (cm.)
(- if absent)

a. water table	—
b. rooting (effective)	29
c. root restricting layer	—
d. frozen layer	—
e. bedrock	—
f. carbonate	—
g. salinity	—

Particle Size Analysis

Horizon Desig.	>2mm %	<2mm %	Sand %	Silt %	Clay %	Class
LFH						
C		100	29.6	38.7	31.7	cl
IIC	80	20	66.7	17.9	15.4	sl

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available		Exchangeable				Pyrophosphate			Se (ppm)	Hg (ppb)
				P (ppm)	S (ppm)	Ca	Mg (me/100g)	Na	K	Fe (%)	Al (%)	Mn (ppm)		
LFH														
C	6.5	5.33	0.436	13.1	3.1	14.3	4.3	0.14	0.13					
IIC	7.3												9	180

LIARD RIV **PRELIMINARY**

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Soil Association TEETER CREEK

Plot Number 9C88-26

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5 cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod	Grade	Class	Kind	Kind Mod
LFH	8-0																				
C	0-29												sil	W	M	GR					
IIC	29-60+					75	60	S	40	S			gls			SGR					

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles						Roots 1				Roots 2			
										Ab.	Si.	Co.	Colour		Bound. Dis.	Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast	aspect		aspect		F C M	F M C	F D P	aspect		D C S S C D	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
LFH																							
C						1	10YR 2/1									P	M	O	MX	F	F	O	MX
IIC						1	10YR 2/1									P	M	C	MX				

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori	Dist.	Cont.	Mor	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.		Woody Material			Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W M S	Kind 1	Kind 2	Decom. N S M H	Hard. S SH H VH	Vol. 0-1-2-3-4					
LFH																						
C	P	V	R	EX	CO	D	I	M														
IIC	P	M	R	MX	CO	D	I	H														

PRELIMINARY

7.5.2 SWB Zone

Those soil associations occupying primarily the spruce-willow-birch biogeoclimatic zone include: the Chalford Creek, Moule Creek, Mt. Halkett and Teeter Creek associations.

CH Chalford Creek Associations

Map Units of the Chalford Creek Association

CH - This map unit consists of well to rapidly drained, Dystric Brunisol soils developed on colluvial materials.
(Terrain Unit: C)

CH-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: C/R, C/Rs, C//R)

CH_1 - This map unit contains gullied colluvial and undifferentiated deposits.
(Terrain Units: C-V, Cv-V, Cvm-V, Cvf-V, Cva-V, Us-V)

CH_1-MH_4-R - Mt. Halkett Association soils and bedrock oucrops which are both also gullied occupy a significant portion of this map unit.
(Terrain Units: C/M/R-V, Cva/Mv/R-V)

CH_1-R - Gullied bedrock outcrops occupy a significant portion of this unit.
(Terrain Units: C/R-V, Cv/Rs-V, C-V/R, Cva//Rs-V, Cv//R-V, Cvb//Rs-V)

CH_2 - Shallow (<1 m) colluvial deposits overlying bedrock form the soil parent materials of this map unit. The soils are often lithic.
(Terrain Unit: Cvb)

CH_2-ME - Moule Creek Association soils occupy a significant portion of this map unit.
(Terrain Units: Cv/Ov, Cvf/Ov, Cv//Ov)

CH_2-MH_2 - Shallow (<1 m) Mt. Halkett Association soils occupy a significant portion of this map unit.
(Terrain Units: Cv/Mv, Cv/Mvb, Cv = Mv)

CH_2-MH_2-R - Shallow (<1 m) Mt. Halkett Association soils and bedrock outcrops occupy significant portions of this map unit.
(Terrain Units: Cv/Mv/R, Cv/Mv = R, Cv/Mv/Rs)

CH_2-MH_3 - Blanketed (>1 m) Mt. Halkett Association soils occupy a large portion of this map unit.
(Terrain Unit: Cv/Mb)

CH_2-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: Cv/R, Cv//R, Cvb//R, Cv//Rs, Cva//R, Cv = Rs, Cv/Rs)

CH_3 - This map unit is composed of soils developed on deep (>1 m) blanketed colluvial deposits overlying bedrock, and some landslide deposits.
(Terrain Units: Crb, Cbv, Cr, Cbm, Chm, Cm)

CH_3-MH_2 - Shallow (<1 m) Mt. Halkett Association soils occupy a large portion of this map unit.
(Terrain Unit: Cbv/Mv)

CH_3-MH_3 - Deep (>1 m) blanketed Mt. Halkett Association soils occupy a major portion of this unit.
(Terrain Unit: Cb = Mb)

PRELIMINARY

CH_3-R - Bedrock outcrops occupy a minor portion of this map unit.
(Terrain Unit: Cbh//R)

CH_4 - Colluvial apron and fan deposits form the soil parent materials in this map unit.
(Terrain Units: Cav, Cf, Ca, Cba, Cfv)

CH_4-ME - Moule Creek Association soils occupy a minor portion of this map unit.
(Terrain Unit: Cfv//Ov)

CH_4-MH_3 - Deep (>1 m) blanketed Mt. Halkett Association soils occupy a large portion of this map unit.
(Terrain Unit: Ca/Mb)

CH_4-R - Bedrock outcrops occupy significant portions of this map unit.
(Terrain Units: Cav//R, Cvf/R, Caf//Rs, Cba//R, Cba/Rs, Cfa//R)

CH_4-TE_2 - Level fluvial deposits of the Teeter Creek Association occupy a minor portion of this map unit.
(Terrain Unit: Cbv//Fl)

CH_5 - The soils of this map unit are actively failing.
(Terrain Unit: Crh-F)

CH_5-R_1 - Bedrock outcrops which are also failing occupy a significant portion of this map unit.
(Terrain Units: Cmb//R-F, Crm//Rs-F, Cvr/Rs-F, Cvb/Rs-FS, Crh/Rs-F, Crh/R-F, Cvb/R-F)

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CH$_6$-R$_9$ - This map unit is subject to gullying and rapid mass wasting.
(Terrain Units: Cva//Rs-VR, Cvf/Rs-VR)

CH$_7$ - This map unit has been failing but is presently inactive or stabilized.
(Terrain Units: Crm-F^I, Cbv-F^I)

CH$_7$-R$_7$ - This map unit has been failing but is presently inactive.
(Terrain Units: Cvr/R-F^I, Cvm//R-F^I)

CH$_8$ - Soils of this map unit are subject to rapid mass wasting.
(Terrain Units: Cva-R, Cv-R)

CH$_8$-R$_3$ - This map unit is subject to rapid mass wasting.
(Terrain Units: Cv//R-R, Cv/R-R)

CH$_{10}$-R$_6$ - This map unit is actively gullied and failing.
(Terrain Units: Cbr/Rs-FV plus Cva = Rs-V plus Crm//Rs-F plus Cmv/Rs-VF plus Cvf//R-V, Cmv/Rs-FV

CH$_{12}$ - This map unit is subject to solifluction.
(Terrain Unit: Cv-S)

CH$_{13}$-R$_8$ - This map unit is subject to gullying, rapid mass wasting and is failing.
(Terrain Unit: Cva = Rs-VRF)

CH$_{14}$-R$_{10}$ - This unit is subject to solifluction and gullying.
(Terrain Units: Cva//R-VS, Cva-VS)

A profile description of a Dystric Brunisol of the Chalford Creek Association is given.

PRELIMINARY

LIARD RIVL..

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Soil Association CHALFORD CREEK

Plot Number 9032-80

Terrain Classification rfCv

N.T.S. Sheet 94M

Soil Moisture Subclass HUMID

Soil Drainage RAPIDLY

Perviousness RAPIDLY

Free Water ABSENT

Flood Hazard NO HAZARD

Depth to: (cm.)
(- if absent)

a. water table —
b. rooting (effective) 57
c. root restricting layer —
d. frozen layer —
e. bedrock —
f. carbonate —
g. salinity —

Particle Size Analysis

Horizon Desig.	>2mm %	<2mm %	Sand %	Silt %	Clay %	Class
Ah						
Bm	1	99	19.0	68.4	12.6	SiL
C	22	78	40.5	52.0	7.5	SiL

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca	Exchangeable Mg (me/100g)	Exchangeable Na	Exchangeable K	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
Ah														
Bm	6.4	2.16	0.138	6.2	0.2	3.9	1.5	0.02	0.10	0.73	0.50	39		
C	7.4												1	120

Soil Association CHALFORD CREEK

Plot Number 90S2-26

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
Ah	0-7																				
Bm	7-57																				
C	57-60+																				

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles					Bound. Dis.	Roots 1				Roots 2			
										Ab.	Si.	Co.	Colour			Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast.	aspect		aspect		F C M	F M C	F D P	aspect		C S D	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
Ah																							
Bm																							
C																							

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.		Woody Material			Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
													Kind	Kind	Decom.	Hard	Vol.					
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W M S	1	2	N S M H	S SH H VH	0 1 2 3 4					
Ah																						
Bm																						
C																						

ME Moule Creek Association

Map Units of the Moule Creek Association

ME - This map unit is composed of very poorly drained, Fibrisol soils developed in organic accumulation areas.
(Terrain Units: Obv, $\frac{\text{Ov}}{\text{Fa}}$)

ME-MH$_3$ - A significant portion of this map unit is occupied by deep (>1 m) blanketed Mt. Halkett Association soils.
(Terrain Units: Ov/Mb, Ov = Mbv)

ME$_1$ - Permafrost is encountered within 1 meter of the surface in this map unit.
(Terrain Unit: Obv-X)

A profile description of Moule Creek Association soil is not available.

MH Mt. Halkett Association

Map Units of the Mt. Halkett Association

MH-CH - This map unit consists of well to imperfectly or poorly drained, Eutric Brunisol on Humic Gleysol soils developed from morainal materials plus a significant portion of soils of the Chalford Creek Association.
(Terrain Unit: M/C)

MH-ME - Moule Creek Association soils occupy a significant portion of this map unit.
(Terrain Units: M = O, M/Obv)

MH-R - Bedrock outcrops occupy a large portion of this map unit.
(Terrain Unit: M/R)

MH$_1$ - This map unit consists of soils derived from deep (>1 m) to shallow (<1 m) morainal materials overlying bedrock. The soils are often lithic phase.
(Terrain Units: Mbv, $\frac{\text{Mbv}}{\text{Rh}}$)

MH$_1$-CH - Chalford Creek Association soils occupy a minor portion of this map unit.
(Terrain Unit: Mbv//C)

MH$_1$-ME - Moule Creek Association soils occupy a large portion of this unit.
(Terrain Unit: Mbv/Ov)

MH$_2$ - This map unit is composed of soils developed from shallow (<1 m) morainal deposits overlying bedrock.
(Terrain Units: Mvr, Mv, Mvb, $\frac{\text{Mv}}{\text{Rm}}$)

MH_2-CH - Chalford Creek Association soils occupy a minor portion of this map unit.
(Terrain Unit: Mv//C)

MH_2-CH-R - Chalford Creek Association soils and bedrock outcrops occupy significant portions of this map unit.
(Terrain Unit: Mvb/C/R)

MH_2-CH_2 - Shallow ($<$1 m) Chalford Creek Association soils occupy a significant portion of this map unit.
(Terrain Units: Mvb/Cv, Mv/Cv)

MH_2-CH_2-R - Shallow ($<$1 m) Chalford Creek Association soils and bedrock outdrops occupy a significant portion of this map unit.
(Terrain Units: Mv = Cv/R, Mv = Cv/Rm, Mvb = Cv/R, Mv = Cv = R, Mv/Cv/R, Mv = Cv//R)

MH_2-ME - Moule Creek Association soils occupy a significant portion of this map unit.
(Terrain Units: Mv/Ov, Mv//Ov, Mvb//Ov)

MH_2-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: Mvr = R, Mv/R, Mv = R, Mvb//R, Mv//R, Mvb/R)

MH_2-R-CH_2 - Bedrock outcrops and shallow ($<$1 m) Chalford Creek Association soils occupy a significant portion of this map unit.
(Terrain Units: Mvb//R = Cva, Mv/R = Cv)

MH_2-R-ME - Bedrock outcrops and Moule Creek Association soils occupy a significant portion of this map unit.
(Terrain Unit: Mvb//R = Ov)

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MH_3 - This map unit is composed of soils developed in deep (>1 m) morainal deposits overlying bedrock.
(Terrain Unit: Mb)

MH_3-CH - Chalford Creek Association soils occupy a significant portion of this map unit.
(Terrain Unit: Mb/C)

MH_3-CH_3 - Shallow (<1 m) Chalford Creek Association soils occupy a significant portion of this map unit.
(Terrain Units: Mb//Cv, Mv/Cv)

MH_3-ME - Moule Creek Association soils occupy a significant portion of this map unit.
(Terrain Units: Mb//Ov, Mb/Ov, Mbm//Ov, Mbv//Ov)

MH_3-R - Bedrock outcrops occupy a large portion of this map unit.
(Terrain Unit: Mb/R)

MH_3-TE_6 - Shallow (<1 m) Teeter Creek Association soils occupy a significant portion of this map unit.
(Terrain Unit: Mb//Fv)

MH_4 - Soils of this map unit have developed gullied morainal materials.
(Terrain Units: M-V, Mm-V, Ms-V, Mbv-V, Mb-V)

MH_4-CH - Chalford Creek Association soils occupy a significant portion of this map unit.
(Terrain Units: M-V/C, M-V = C, Mv-V/C, Mv-V = C, Mb-V/C)

MH_5 - The soils of this map unit have developed on ridged or subdued morainal deposits.
(Terrain Units: Mm, Mr, Mm/Mr)

MH_6 - The morainal materials of this unit have been bevelled.
(Terrain Unit: Mb-B)

MH_7 - The soils of this map unit are dissected by glacial meltwater channels.
(Terrain Units: Mvb-E^G, Mm-E^G)

MH_7-ME - Moule Creek Association soils occupy a large portion of this map unit.
(Terrain Unit: M-E^G/Ov)

MH_7-R - Bedrock outcrops occupy a minor portion of this map unit.
(Terrain Unit: Mvb//R-E^G)

MH_8 - The soils of this map unit have permafrost occuring within 1 meter of the surface.
(Terrain Unit: Mm-X)

MH_9-R - The shallow ($<$1 m) morainal materials and the bedrock outcrops of this map unit are subject to solifluction.
(Terrain Unit: Mv/R-S)

MH_{11}-R_3 - The soils and bedrock outcrops of this map unit are subject to rapid mass wasting.
(Terrain Unit: Mv/R-R)

MH_{12}-CH_{11} - The soils of this map unit are failing and subject to rapid mass wasting.
(Terrain Unit: Mvb = Cvb-FR)

MH_{14}-R_1 - This map unit is failing.
(Terrain Unit: $\frac{\text{Mvb}}{\text{R}}$ = Rs-F)

A profile description of a Humic Gleysol soil of the Mt. Halkett Association is given.

PRELIMINARY

LIARD RIV[illegible]

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Soil Association MT. HALKETT

Plot Number 9034-80

Terrain Classification gfMb

N.T.S. Sheet 94M

Soil Moisture Subclass HUMID

Soil Drainage POORLY

Perviousness SLOWLY

Free Water PRESENT

Flood Hazard NO HAZARD

Depth to: (cm.)
(- if absent)

a. water table 35 (PERCHED)
b. rooting (effective) 20
c. root restricting layer —
d. frozen layer —
e. bedrock —
f. carbonate —
g. salinity —

Particle Size Analysis

Horizon Desig.	>2mm %	<2mm %	Sand %	Silt %	Clay %	Class
LFH						
Ah	20	80	8.8	56.3	34.9	SiCl
ACg						
Cg	44	56	60.1	33.1	6.8	Sl

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca (me/100g)	Exchangeable Mg (me/100g)	Exchangeable Na (me/100g)	Exchangeable K (me/100g)	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
LFH														
Ah	7.4	25.47	0.801	20.1	20.2	47.0	18.0	0.13	0.17					
ACg														
Cg	8.5												2	50

LIARD RIV **PRELIMINARY**

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Soil Association MT. HALKETT

Plot Number 9034-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm Min.	Max.	Horizon Boundary Dist.	Form	Coarse Fragment Descript. % by vol.	Gravel <7.5cm %	Type	Cobbles 7.5 - 25 cm %	Type	Stones >25 cm %	Type	Soil Texture < 2mm	Structure Primary Grade	Class	Kind	Kind Mod.	Secondary Grade	Class	Kind	Kind Mod.
LFH	7-0																				
Ah	0-20												l	W	FM	GR					
ACg	20-33					60	50	R	50	R			gsl			MA					
Cg	33-70+					60	50	R	50	R			gsl			MA					

Horizon Desig.	Mst. D M W	Consist. dry	moist	wet	plast	Colour 1 aspect		Colour 2 aspect		Mottles Ab F C M	Si F M C	Co. F D P	Colour aspect		Bound Dis. D C S D	Roots 1 Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX	Roots 2 Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX
LFH																							
Ah	M		2	2	1	1	10YR 2/1									F	C	H	MX	F	P	O	MX
ACg	M		2	2	2																		
Cg	W			2	2	1	5Y 4/1									V	F	O	MX				

Horizon Desig.	Pores Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX	Cont. CO DC	Mor. S D C	Type V I T	Hor. Por. S M H	Clay Films Freq. F C M CS	Thi. TN MTK TK VTK	Loc. 0 to 8	Effer. Deg. VW W M S	Organic Material Description Material Composit. Kind 1	Kind 2	Decom. N S M H	Woody Material Hard. S SH H VH	Vol. 0-1-2-3-4	Pyro. Index	von Post Scale	Fiber Analysis Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
LFH																						
Ah																						
ACg																						
Cg																						

TE Teeter Creek Association

Map Units of the Teeter Creek Association

This association also occurs in the boreal black and white spruce biogeoclimatic zone.

TE_3-ME - Regosol soils formed on active fluvial fan deposits and Moule Creek Association Mesisol soils occupy this map unit. (Terrain Unit: $F^{A}f$/Ov)

TE_8 - Soils of this map unit have permafrost encountered within 1 meter of the surface. (Terrain Unit: Ft-X)

A profile description of a Regosol soil of the Teeter Creek Association is presented with the description of that association in section 7.5.1 of this report.

PRELIMINARY

7.6 SOILS OF THE RABBIT PLATEAU

The Rabbit Plateau physiographic region features are described previously in this report in Chapter 2, Section 2.7.

Soil parent materials occuring in this region are mainly morainal and colluvial with lesser glaciofluvial, fluvial and organic deposits. Bedrock outcrops occur primarily where exposed by stream bank erosion and at higher elevations.

The topography is moderately rolling to occasionally steep.

Soils in this region are affected by both the boreal white and black spruce and the spruce-willow-birch biogeoclimatic zones.

The soil associations defined for this region include: the Berg Creek, Long Mountain Creek, Rabbit River, Sick Wife Creek, Vents Creek, Boya Creek, Chee Mountain, and Horneline Creek associations.

7.6.1 BWBS Zone

The soil associations occurring most commonly in the boreal white and black spruce biogeoclimatic zone are: the Berg Creek, Long Mountain Creek, Rabbit River, Sick Wife Creek and Vents Creek associations.

BC Berg Creek Association

Map Unit of the Berg Creek Association

BC - This map unit consists of very poorly drained, Mesisol soils developed on organic accumulations.
(Terrain Units: Obv, $\frac{\text{Obv}}{\text{Fl}}$, $\frac{\text{Ov}}{\text{Fl}}$)

A profile description of a Mesisol soil of the Berg Creek Association is given.

PRELIMINARY

LIARD RIV

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Soil Association

BERG CREEK

Plot Number

9026·80

Terrain Classification

$mO^{B}b$

N.T.S. Sheet

94M

Soil Moisture Subclass

HUMID

Soil Drainage

POORLY

Perviousness

MODERATELY

Free Water

PRESENT

Flood Hazard

MAY BE EXPECTED

Depth to: (cm.)
(- if absent)

a. water table	50
b. rooting (effective)	20
c. root restricting layer	–
d. frozen layer	–
e. bedrock	–
f. carbonate	–
g. salinity	–

Particle Size Analysis

Horizon Desig.	>2 mm %	<2 mm %	Sand %	Silt %	Clay %	Class
Of						
Om		100				–

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca (me/100g)	Exchangeable Mg (me/100g)	Exchangeable Na (me/100g)	Exchangeable K (me/100g)	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
Of														
Om	3.8	45.54	0.836	9.9	30.4	30.0	2.5	0.55	0.30					

LIARD RIV **PRELIMINARY**

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Soil Association BERG CREEK

Plot Number 9026-85

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm Min.	Max.	Horizon Boundary Dist.	Form	Coarse Fragment Descript. % by vol.	Gravel <7.5cm %	Type	Cobbles 7.5 - 25 cm %	Type	Stones >25 cm %	Type	Soil Texture < 2mm	Structure Primary Grade	Class	Kind	Kind Mod.	Secondary Grade	Class	Kind	Kind Mod.
Of	0-20	15	25	C	S																
Om	20-75+																				

Horizon Desig.	Mst. D M W	Consist. dry	moist	wet	plast	Colour 1 aspect	Colour 2 aspect	Mottles Ab. F C M	Si. F M C	Co. F D P	Colour aspect	Bound. Dis. D C S	Roots 1 Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX	Roots 2 Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX
Of													P	M	H	MX				
Om													P	F	O	MX				

Horizon Desig.	Pores Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX	Cont. CO DC	Mor. S D C	Type V I T	Hor. Por. S M H	Clay Films Freq. F C M CS	Thi. TN MTK TK VTK	Loc. 0 to 8	Effer. Deg. VW W M S	Organic Material Description Material Composit. Kind 1	Kind 2	Decom. N S M H	Woody Material Hard. S SH H VH	Vol. 0 1 2 3 4	Pyro. Index	von Post Scale	Fiber Analysis Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
Of	P	F	R	MX	DC	D	1	M					3		N	SH	2		02			
Om	P	F	R	MX	DC	D	1	M					3		M	SH	1		05	82	52	0

LM Long Mountain Creek Association

Map Units of the Long Mountain Creek Association

LM_1 - Soils of this map unit are well to rapidly drained, Eutric Brunisol soils developed on glaciofluvial fan deposits.
(Terrain Unit: FG_{fb})

LM_2 - The soils of this unit have developed on glaciofluvial terrace deposits which are gullied.
(Terrain Unit: FG_{t-V})

LM_3 - This map unit consists of soils developed on glaciofluvial terrace deposits.
(Terrain Unit: FG_t)

LM_4 - The soils of this map unit have developed on esker and kame, glaciofluvial deposits which are ridged and subdued.
(Terrain Units: FG_r, FG_m)

LM_5 - This map unit is composed of shallow (<1 m) to deep (>1 m) glaciofluvial deposits overlying morainal deposits or bedrock.
(Terrain Units: FG_b, $\frac{\mathrm{FG}_v}{\mathrm{M}}$)

A profile description of a Long Mountain Creek Association soil is not available.

RT Rabbit River Association

Map Units of the Rabbit River Association

RT - This map unit consits of soils developed on morainal deposits which are well to imperfectly drained Eutric Brunisol or Gray Luvisol soils.
(Terrain Unit: M)

RT_1 - This map unit is composed of deep (>1 m) morainal deposits which have well to imperfectly drained, Eutric Brunisol or Gray Luvisol soils developed on them.
(Terrain Unit: Mb)

RT_1-BC - Berg Creek Association soils occupy a minor portion of this map unit.
(Terrain Unit): Mb//Obv)

RT_1-RT_3 - Drumlinized morainal deposits occupy a minor portion of this map unit.
(Terrain Unit: Mb//Mr)

RT_1-RT_4 - Shallow (<1 m) morainal deposits overlying bedrock occupy a large portion of this map unit.
(Terrain Unit: Mb/Mv)

RT_1-VC_1 - Gullied Vents Creek Association soils occupy a large portion of this map unit.
(Terrain Unit: Mb/C-V)

RT_2 - Deep (>1 m) and shallow (<1 m) morainal deposits overlying bedrock make up the soil parent materials of this map unit.
(Terrain Units: Mbv, $\frac{\text{Mbv}}{\text{Rr}}$)

RT_2-R - Bedrock outcrops occupy a minor portion of this map unit.
(Terrain Unit: Mbv//R)

RT$_2$-RT$_3$ - Drumlinized morainal materials occupy a large portion of this map unit. (Terrain Unit: Mbv/Mr)

RT$_3$-BC-LM$_2$ - Drumlinized morainal materials, Berg Creek Association soil and ridged Long Mountain Creek Association soils make up the composition of this map unit. (Terrain Unit: Mm/Obv/F$^{G}_{r}$)

RT$_3$-RT$_2$ - Shallow ($<$1 m) and deep ($>$1 m) morainal materials mantled over bedrock occupy a minor portion of this map unit. (Terrain Unit: Mr//Mbv)

RT$_4$-R - Shallow ($<$1 m) morainal materials with minor amounts of bedrock outcrops occupy this map unit. (Terrain Unit: Mv//R)

RT$_4$-R-VC - Bedrock outcrops and Vents Creek Association soils occupy a significant portion of this map unit. (Terrain Unit: Mv/R/C)

RT$_6$ - This map unit consists of soils developed on morainal materials which are dissected by glacial meltwater channels. (Terrain Unit: Mb-E^{G})

RT$_6$-SI$_1$ - Aproned Sick Wife Creek Association soils occupy a minor portion of this map unit. (Terrain Unit: Mb-E^{G}//Fa)

A profile description of a Gray Luvisol soil of the Rabbit River Association is given.

PRELIMINARY

LIARD RIVER SOILS

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Soil Association	**Plot Number**
RABBIT RIVER	9025-80
Terrain Classification	**N.T.S. Sheet**
gfMb	94M
Soil Moisture Subclass	**Soil Drainage**
SUBHUMID	WELL

Perviousness	**Free Water**	**Flood Hazard**
RAPIDLY	ABSENT	RARE

Depth to: (cm.)
(- if absent)

a. water table —
b. rooting (effective) 30
c. root restricting layer 30
d. frozen layer —
e. bedrock —
f. carbonate (DID NOT REACH)
g. salinity —

Particle Size Analysis

Horizon Desig.	>2 mm %	<2 mm %	Sand %	Silt %	Clay %	Class
LFH						
Bm	7	93	37.0	52.4	10.6	sil
Ae	22	78	46.2	43.0	10.8	l
AB						
Bt	46	54	36.5	35.8	27.7	cl

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca (me/100g)	Exchangeable Mg (me/100g)	Exchangeable Na (me/100g)	Exchangeable K (me/100g)	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
LFH														
Bm	6.0	0.71	0.057	5.9	0.6	4.0	0.5	0.12	0.12	0.34	0.31	27		
Ae	6.4	0.26	0.042	4.6	0.8	3.2	0.4	0.11	0.06					
AB														
Bt	6.9												2	140

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Soil Association RABBIT RIVER

Plot Number 9025-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
LFH	5-0	3	7	C	S																
Bm	0-5	4	8	C	W	40	75	S	25	S			sil	W	M	SBK					
Ae	5-19	14	18	G	S	40	75	S	25	S			gsicl	WM	M	SBK					
AB	19-30	10	12	C	S	40	75	S	25	S			gcl	MS	MC	SBK					
Bt	30-40+					50	60	S	25	S	15	S	gcl	S	C	SBK					

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles					Bound. Dis.	Roots 1				Roots 2			
										Ab.	Si.	Co.	Colour			Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast	aspect		aspect		F C M	F M C	F D P	aspect		D C S D	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
LFH																							
Bm	M		2	2	2	1	10YR 4/6									F	F	H	MX				
Ae	M		2	2	3	1	2.5Y 5/2									V	F	O	MX				
AB	M		3	3	3	1	10YR 4/4									V	F	H	EX				
Bt	M		3	3	3	1	10YR 4/4																

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material		Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W M S	Kind 1	Kind 2	Decom. N S M H	Hard. S SH H VH	Vol. 0-1-2-3-4					
LFH																						
Bm	F	F	R	EX	CO	D	1	M														
Ae	F	V	R	EX	CO	D	1	M														
AB	V	F	R	EX	DC	D	1	S	F	TN	2											
Bt	V	V	R	EX	DC	D	1	S	M	MTK	2											

SI Sick Wife Creek Association

Map Units of Sick Wife Creek Association

SI - This map unit consists of shallow (<1 m) fluvial deposits overlying morainal materials. The soils of this association are well to imperfectly drained, Eutric Brunisol, Regosol, or Gleysol soils.
(Terrain Unit: $\frac{Fv}{M}$)

SI_1 - Soils of this map unit are well drained, Eutric Brunisol soils developed on fluvial fan deposits.
(Terrain Units: Ff, Fa)

SI_2-SI_3 - The soils of this map unit have developed on fluvial terrace and active floodplain deposits.
(Terrain Unit: Ft/FA_1)

SI_3 - This map unit consists of imperfectly to poorly drained, Regosol or Gleysol soils developed on active floodplain deposits.
(Terrain Unit: FA_1)

SI_4 - Soils of this map unit are well drained Regosol soils developed on active fluvial fan deposits.
(Terrain Unit: FA_f)

A profile description of the Sick Wife Creek Association soil is not available.

VC Vents Creek Association

Map Units of the Vents Creek Association

VC - This map unit consists of well to rapidly Eutric Brunisol or Regosol soils developed from steep, undifferentiated unconsolidated materials.
(Terrain Unit: Us)

VC-R - Bedrock outcrops occupy a minor portion of this map unit.
(Terrain Units: C//R, Us/R)

VC_1 - This map unit consists of soils developed from gullied colluvial and undifferentiated materials.
(Terrain Units: Us-V, C-V, Cs-V)

VC_1-R - Bedrock outcrops occupy a major portion of this map unit.
(Terrain Unit: C = R-V)

VC_2 - Soils of this map unit have developed on hummocky and rolling landslide deposits.
(Terrain Units: Ch, Cm)

VC_3 - This map unit is composed of soils formed from colluvial apron deposits.
(Terrain Unit: Ca)

A profile description of a Vents Creek Association is not available.

PRELIMINARY

7.6.2 SWB Zone

The soil associations of the Rabbit Plateau region which occur mainly in the spruce-willow-birch biogeoclimatic zone are: the Boya Creek, Chee Mountain and Horneline Creek associations.

BK - Boya Creek Association

Map Units of the Boya Creek Association

BK - This map unit consists of well to rapidly drained, Eutric Brunisol or Regosol soils developed on colluvial and undifferentiated materials.
(Terrain Units: C, Us, Cs)

BK-CM - Chee Mountain Association soils occupy a large portion of this map unit.
(Terrain Unit: C/M)

BK-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: C//R, C/R)

BK_1 - Soils of this map unit have developed on colluvial apron deposits.
(Terrain Unit: Ca)

BK_2 - Gullied colluvial and undifferentiated materials form the soil parent materials of this map unit.
(Terrain Units: Us-V, C-V, Cbv-V)

BK_2-R - Bedrock outcrops occupy a large portion of this map unit.
(Terrain Unit: C-V/R)

PRELIMINARY

BK_3 - Shallow (<1 m) and deep (>1 m) colluvial materials overlying bedrock are the soil parent materials of this map unit. The soils are often lithic.
Terrain Unit: Cbv)

CM Chee Mountain Association

Map Units of the Chee Mountain Association

CM-R - Bedrock outcrops occupy a large portion of this map unit.
(Terrain Unit: M/R)

CM-SE_2 - This map unit consists of well to moderately well drained, Eutric Brunisol or Gray Luvisol soils developed on morainal materials plus level Sick Wife Creek Association soils which occupy a large portion of the unit.
(Terrain Unit: M/Fl)

CM_1 - Soils of this map unit have developed on shallow ($<$1 m) morainal materials overlying bedrock and are frequently lithic.
(Terrain Units: Mv, $\frac{Mv}{Rr}$)

CM_1-BK - Boya Creek Association soils occupy a minor portion of this map unit.
(Terrain Unit: $\frac{Mv}{Rm}$//C)

CM_1-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: Mv//R, Mv/R)

CM_1-R-BK - Bedrock outcrops and Boya Creek Association soils occupy significant portions of this map unit.
(Terrain Unit: Mv/R/C)

CM_2 - The soils of this map unit have developed on shallow ($<$1 m) to deep ($>$1 m) morainal materials.
(Terrain Unit: Mbv)

CM_2-BK - Boya Creek Association soils occupy a minor portion of this map unit.
(Terrain Unit: Mbv//C)

CM_2-R - Bedrock outcrops occupy a minor portion of this map unit.
(Terrain Unit: Mbv//R)

CM_3 - This map unit consists of soils formed from deep (>1 m) morainal materials overlying bedrock.
(Terrain Units: Mb, $\frac{Mb}{Rh}$)

CM_3-SI - Apron shaped Sick Wife Creek Association soils occupy a significant portion of this map unit.
(Terrain Units: Mb/Fa, Mb = Fa)

CM_4 - This map unit consists of soils developed on morainal materials which are dissected by glacial meltwater channels.
(Terrain Units: Mb-E^G, Mr-E^G)

CM_4-R - Bedrock outcrops occupy a minor portion of this map unit.
(Terrain Unit: Mbv-E^G//R)

CM_5 - Drumlinized morainal materials are the soil parent materials of this map unit.
(Terrain Unit: Mr)

CM_5-CM_2 - A large portion of this map unit is mantled by shallow (<1 m) and deep (>1 m) morainal materials.
(Terrain Unit: Mr/Mbv)

CM_5-SI_1 - Aproned Sick Wife Creek Association soils occupy a large portion of this map unit.
(Terrain Unit: Mm/Fa)

PRELIMINARY

CM_6 - Gullied morainal materials occupy this map unit.
(Terrain Units: Mbv-V, M-V)

A profile description of a Chee Mountain Association soil is not available.

HC Horneline Creek Association

Map Units of the Horneline Creek Association

HC_1 - The soils of this map unit have developed from hummocky glaciofluvial deposits. These soils are well to rapidly drained, Eutric Brunisol soils. (Terrain Unit: $F^{G}h$)

HC_2 - This map unit is composed of soils formed on terraced and occasionally subdued or blanketed glaciofluvial deposits. (Terrain Units: $F^{G}tm$, $F^{G}tb$, $F^{G}t$)

HC_3 - The soils of this map unit have developed on kettled, glaciofluvial materials. (Terrain Units: $F^{G}t\text{-}H$)

HC_4 - Shallow (<1 m) and deep (>1 m) mantled fluvial materials overlying bedrock or morainal materials are the soil parent materials of this map unit. (Terrain Units: $F^{G}bs$, $F^{G}v$, $\frac{F^{G}v}{M}$)

A profile description of a Horneline Creek Association soil is not available.

7.7 SOILS OF THE ROCKY MOUNTAINS

Features of the Rocky Mountains physiographic region are described in Chapter 2, Section 2.6 of this report.

Soil parent materials are mainly colluvial and morainal with lesser amounts of fluvial glaciofluvial and organic deposits. Bedrock outcrops are frequent in this region.

The boreal white and black spruce and the spruce-willow-birch biogeoclimatic zones occur in the Rocky Mountains region. Some areas of Alpine tundra occur but these are generally grouped in the SWB zone for soil association definition.

The topography is strongly rolling to very steep in this region.

Soil associations defined for this region are: the Forcier Creek, Gundahoo River, Hoole Creek, Lapie Creek, Prochniak Creek, Muncho Lake, Mt. Prudence, Sulfur Creek and Trout River associations.

7.7.1 BWBS Zone

The soil associations of the Rocky Mountains region which occur primarily in the boreal white and black spruce biogeoclimatic zone are: the Forcier Creek, Gundahoo River, Hoole Creek, Lapie Creek and Prochniak Creek associations.

FR Forcier Creek Association

Map Units of the Forcier Creek Association

FR-LA - The soils of this map unit are well to poorly drained, Eutric Brunisol, Regosol or Gleysol soils developed on fluvial deposits. Lapie Creek Association soils occupy a significant portion of this map unit. (Terrain Unit: Fl/$\mathrm{F^{A}f}$/Ov)

FR$_1$ - Fluvial fan and apron deposits form the soil parent materials of this map unit. (Terrain Units: Fa, Ff, Ffl, $\frac{\mathrm{Ff}}{\mathrm{F^{G}t}}$)

FR_1-FR_2 - Active floodplain deposits are soil parent materials form a large portion of this unit.
(Terrain Units: Fat/$F^{A}l$, Ff/$F^{A}l$)

FR_1-HO_4 - Gullied Hoole Creek Association soils occupy a large portion of this map unit.
(Terrain Unit: Fa/$F^{G}t$-V)

FR_2 - Soils of this map unit are developed on active fluvial terrace and level deposits.
(Terrain Unit: $F^{A}t$/$F^{A}l$)

FR_3 - This map unit consists of soils developed on active fluvial fan deposits.
(Terrain Unit: $F^{A}f$)

FR_4 - This map unit is dissected by relic stream channels.
(Terrain Unit: Fl-E)

FR_5 - The soils of this map unit are well drained, Eutric Brunisol or Regosol soils developed on level, terraced and sometimes steep fluvial deposits.
(Terrain Units: Fl, Ft, Flf, Fs)

FR_5-FR_1 - Fluvial fan deposits occupy a large portion of this map unit.
(Terrain Unit: Fl/Ff)

FR_5-LA - Lapie Creek Association soils occupy a significant portion of this map unit.
(Terrain Units: Ftf/Ovb, Flf = Ov)

FR_5-PC_3 - Fan and apron shaped Prochniak Creek Association soils occupy a major portion of this map unit.
(Terrain Unit: Ft = Cfa)

FR_6 - The fluvial fan deposits of this map unit are channelled and subject to snow avalanches. (Terrain Unit: Ff-AE)

FR_7 - This map unit is subject to active stream channelling.
(Terrain Units: Flt-E^A, Ftl-E^A, Fl/Ff-E^A, Ff = Flt-E^A, Flt/F^Al-E^A, Fl-E^A, F^Al-E^A, Ffl/F^Al-E^A)

A profile description of a Regosol soil of the Forcier Creek Association is given.

PRELIMINARY

LIARD RIV

Soil Association FORCIER CREEK

Plot Number 9039-80

Terrain Classification gsF^{A}1

N. T. S. Sheet 94N

Soil Moisture Subclass HUMID

Soil Drainage RAPIDLY

Perviousness RAPIDLY

Free Water ABSENT

Flood Hazard MAY BE EXPECTED

Depth to: (cm.)
(- if absent)

a. water table —
b rooting (effective) 19
c. root restricting layer —
d. frozen layer —
e. bedrock —
f. carbonate SURFACE
g. salinity —

Particle Size Analysis

Horizon Desig.	>2mm %	<2mm %	Sand %	Silt %	Clay %	Class
Ck$_1$	6	94	84.7	10.9	4.4	ls
Ck$_2$	42	58	90.2	6.8	3.0	s
IICk	3	97	58.9	34.2	6.9	sl

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca (me/100g)	Exchangeable Mg (me/100g)	Exchangeable Na (me/100g)	Exchangeable K (me/100g)	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
Ck$_1$	8.3	0.48	0.053	5.9	5.4	13.6	0.4	0.09	0.09					
Ck$_2$	8.5													
IICk	7.8												4	40

LIARD RIV

PRELIMINARY

Page 2 of 2

Soil Association FORCIER CREEK

Plot Number 9c39-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
Ck$_1$	0-19												s			SG					
Ck$_2$	19-50					75	100	R					gs			SG					
IICk	50-85+												fsl								

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles						Roots 1				Roots 2			
										Ab.	Si.	Co.	Colour		Bound. Dis.	Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast	aspect		aspect		F C M	F M C	F D P	aspect		D C G	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
Ck$_1$																							
Ck$_2$																							
IICk																							

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material		Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W MS S	Kind 1	Kind 2	Decom. N S M H	Hard. S SH H VH	Vol. 0 1 2 3 4					
Ck$_1$												S										
Ck$_2$												S										
IICk												S										

GR Gundahoo River Association

Map Units of the Gundahoo River Association

GR$_1$ - This map unit consists of well drained, Humo-Ferric Podzol soils developed on morainal materials which have been bevelled by glacial stream erosion.
(Terrain Unit: Mb-B)

GR$_2$ - The morainal deposits of this map unit are gullied.
(Terrain Units: Mb-V, Mbv-V, Mbs-V)

GR$_2$-PC$_2$ - Gullied Prochniak Association soils occupy a significant portion of this map unit.
(Terrain Units: Mbs/Cv-V, Mb = Cv-V)

GR$_2$-PC$_2$-R - Gullied Prochniak Association soils and bedrock outcrops occupy a significant portion of this map unit.
(Terrain Unit: Mvb = Cv/R-V)

GR$_3$ - The morainal deposits of this map unit are dissected by glacial meltwater channels.
(Terrain Unit: Mb-EG)

GR$_4$ - Shallow ($<$1 m) to deep ($>$1 m) mantled morainal deposits are the soil parent materials of this map unit. The soils are often lithic.
(Terrain Units: Mbv, Mvr, Mvb, Mb)

GR$_4$-PC - Prochniak Creek Association soils occupy a large portion of this map unit.
(Terrain Unit: Mvb/C)

GR_4-PC_5 - Shallow (<1 m) Prochniak Creek Association soils occupy a minor portion of this map unit.
(Terrain Unit: Mvb//Cv)

GR_4-PC_5-R - Shallow (<1 m) Prochniak Creek Association soils and bedrock outcrops occupy significant portions of this map unit.
(Terrain Units: Mv = Cv/R, Mv/Cv/R)

GR_4-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: Mbr = R, Mvb/R)

GR_5-PC_5 - Shallow (<1 m) morainal materials and a major portion of shallow (<1 m) Prochniak Creek Association soils occupy this map unit.
(Terrain Unit: Mv = Cv)

GR_6 - The soils of this map unit have developed on deep (>1 m) mantled morainal materials overlying bedrock.
(Terrain Unit: Mb)

GR_8-R-PC_{10} - Shallow (<1 m) morainal materials, bedrock outcrops and shallow (<1 m) Prochniak Creek Association soils, all of which are subject to solifluction, make up this map unit.
(Terrain Unit: Mv/R = Cv-S)

A profile description of a Humo-Ferric Podzol soil of the Gundahoo Association is given.

PRELIMINARY

LIARD RIVER SOILS

Page 1 of 2

Soil Association GUNDAHOO RIVER

Plot Number 9010 - 80

Terrain Classification 1Mb

N. T. S. Sheet 94N

Soil Moisture Subclass SUBHUMID

Soil Drainage WELL

Perviousness MODERATELY

Free Water ABSENT

Flood Hazard NO HAZARD

Depth to: (cm.)
(- if absent)

a. water table	—
b. rooting (effective)	42
c. root restricting layer	—
d. frozen layer	—
e. bedrock	—
f. carbonate	—
g. salinity	—

Particle Size Analysis

Horizon Desig.	>2mm %	<2mm %	Sand %	Silt %	Clay %	Class
LF						
Ah						
Ahe						
Bf	2	98	25.5	65.7	8.8	Sil
Bm						
BC						
C	24	76	77.2	14.6	8.2	Sl

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca	Exchangeable Mg (me/100g)	Exchangeable Na	Exchangeable K	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
LF														
Ah														
Ahe														
Bf	4.9	1.79	0.111	3.8	0.9	1.6	0.5	0.08	0.10	0.75	0.50	46		
Bm														
BC														
C	4.5												2	100

LIARD RIV **PRELIMINARY**

Page 2 of 2

Soil Association GUNDAHOO RIVER

Plot Number 9010-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5 cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
LF	4-0	2	7	C	S																
Ah	0-7	6	9	G	W								l	W	F	GR					
Ahe	7-10	2	5	C	W								l	W	F	PL					
Bf	10-20	6	10	G	S								sil	W	FM	SBK					
Bm	20-32	9	12	D	S	20	100	S					l	W	M	SBK					
BC	32-42	9	12	D	S	30	75	S	25	S			gl	W	FM	SBK					
C	42-55+					60	80	S	20	S			gsl	W	M	SBK					

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles					Bound. Dis.	Roots 1				Roots 2			
										Ab.	Si.	Co.		Colour		Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast.	aspect		aspect		F C M	F M C	F D P	aspect		D C S	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
LF																							
Ah	M		2	2	2	1	5YR 2.5/1									A	M	O	MX				
Ahe	M		2	2	2	1	7.5YR 3/2									P	M	H	MX				
Bf	M		2	2	2	1	7.5YR 3/4									F	F	O	MX				
Bm	M		2	2	2	1	10YR 4/6									P	F	O	MX				
BC	M		2	2	2	1	10YR 4/4									F	F	O	MX				
C	M		2	2	1	1										V	F	O	MX				

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material		Pyro Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro Index
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	O to 8	VW W M S	Kind 1	Kind 2	Decom N S M H	Hard. S SH H VH	Vol. 0-1-2-3-4					
LF																						
Ah	A	M	R	MX	DC	D	T	M														
Ahe	P	M	R	EX	DC	D	I	M														
Bf	P	M	R	EX	CO	D	I	M														
Bm	P	F	R	EX	CO	D	I	M														
BC	P	F	R	EX	CO	D	I	M														
C	F	F	R	EX	CO	D	I	H														

HO Hoole Creek Association

Map Units of the Hoole Creek Association

HO - This map unit consists of well drained, Eutric Brunisol soils developed on glaciofluvial materials.
(Terrain Units: F^{G}, $F^{G}b$)

HO_1 - The soils of this map unit are ridged and hummocky developed on esker and kame glaciofluvial deposits.
(Terrain Units: $F^{G}r$, $F^{G}rh$)

HO_2 - Soils of this map unit have developed on kettled glaciofluvial deposits.
(Terrain Units: $F^{G}t\text{-}H$, $F^{G}tr\text{-}H$)

HO_2-LA - Lapie Creek Association soils occupy a minor portion of this map unit.
(Terrain Unit: $F^{G}t\text{-}H//Obv$)

HO_3 - The soils of this map unit have developed on terraced glaciofluvial deposits which are also occasionally level and/or steep.
(Terrain Units: $F^{G}t$, $F^{G}ts$, $F^{G}t/s$)

HO_3-FR - Gullied Forcier Creek Association soils occupy a minor portion of this map unit.
(Terrain Unit: $F^{G}ts//Ff\text{-}V$)

HO_3-PC_5 - Deep (>1 m) mantled Prochniak Creek Association soils occupy a minor portion of this map unit.
(Terrain Unit: $F^{G}t//Cb$)

HO_4 - The glaciofluvial materials of this map unit are gullied.
(Terrain Units: $F^{G}t\text{-}V$, $F^{G}tf\text{-}V$, $F^{G}ts\text{-}V$, $F^{G}s\text{-}V$, $F^{G}s$)

HO_4-FR_5-PC_5 - Level Forcier Creek Association soils and shallow (<1 m) to deep (>1 m) Prochniak Creek Association soils occupy a significant portion of this map unit. (Terrain Unit: $FG_s/Fl = Cbv$)

HO_4-GR_2 - Gullied Gundahoo River Association soils occupy a major portion of this map unit. (Terrain Unit: $FG_s = Mbs$-V)

HO_5 - This map unit is dissected by relic stream channels. (Terrain Unit: FG_{b-E})

HO_6 - This map unit is failing and subject to rapid mass wasting.

(Terrain unit: FG_{ts-FR})

HO_8-R_1 - This map unit is failing. The bedrock crops occupy a minor portion. (Terrain Unit: $FG_s//R$-F)

A profile description of a Hoole Creek Association is not available.

PRELIMINARY

LA Lapie Creek Association

Map Units of the Lapie Creek Association

LA - This map unit is composed of very poorly drained, Mesisol soils developed on organic accumulations.
(Terrain Units: Obv, Ov)

LA-FR - Forcier Creek Association soils occupy a large portion of this map unit.
(Terrain Unit: $\frac{\text{Ov}}{\text{Ft}}$/Fts/Ff)

LA-GR$_4$ - Shallow ($<$ 1 m) Gundahoo River Association soils occupy a major portion of this map unit.
(Terrain Unit: Ova = Mvh)

A profile description of a Lapie Creek Association soil is not available.

PC Prochniak Creek Association

Map Units of the Prochniak Creek Association

PC - This map unit is composed of well drained, Eutric Brunisol or Regosol soils developed on colluvial deposits.
(Terrain Unit: C)

PC-FR - Forcier Creek Association soils occupy a large portion of this map unit.
(Terrain Unit: C/V)

PC-R - Bedrock outcrops occupy a major portion of this map unit.
(Terrain Unit: C = R)

PC$_1$-HO$_3$ - Soils derived from steep undifferentiated materials plus a minor portion of terraced Hoole Creek Association soils make up this mat unit.
(Terrain Unit: Us//FG$_t$)

PC$_2$ - This map unit is gullied.
(Terrain Units: Us-V, C-V, Cv-V, Cba-V, Cvs-V)

PC$_2$-GR$_2$ - Gullied Gundahoo River Association soils occupy a large portion of this map unit.
(Terrain Unit: Cva/Mvb-V)

PC$_2$-HO$_4$ - Gullied Hoole Creek Association soils occupy a minor portion of this map unit.
(Terrain Unit: Us//FG$_t$-V)

PC$_2$-HO$_4$-R2 - Gullied Hoole Creek Association soils and bedrock outcrops occupy significant portions of this map unit.
(Terrain Unit: Cvb/FG$_s$ = R-V)

PC$_2$-R$_2$ - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: C/R-V, C-V/R, C/Rs-V, Cva//Rs-V, Cvb/R-V)

PC$_2$-R$_2$-GR$_2$ - Gullied bedrock outcrops and Gundahoo Association soils occupy significant portions of this map unit.
(Terrain Units: Cv/R/Mv-V, Cv = R/Mv-V, Cvb//Rs = Mv-V)

PC$_3$ - Colluvial fan and apron deposits form the soil parent materials of this map unit.
(Terrain Units: Cf, Cfb, Cav)

PC$_3$-FR$_5$ - Level Forcier Creek Association soils occupy a significant portion of this map unit.
(Terrain Units: Ca = Fl, Cav//Fl, Cfv/Fl, Cfv = Flf, Cf/Ffl)

PC$_3$-GR$_5$-LA - Shallow (<1 m) Gundahoo River Association and Lapie Creek Association soils occupy significant portions of this map unit.
(Terrain Unit: Ca = Mv//Ova)

PC$_3$-HO$_3$ - Terraced Hoole Creek Association soils occupy a large portion of this map unit.
(Terrain Unit: Ca/FG$_t$)

PC$_3$-LA - Lapie Creek Association soils occupy a large portion of this map unit.
(Terrain Unit: Cfv/Ov)

PC$_4$ - This map unit is subject to avalanching.
(Terrain Unit: Ca-A)

PRELIMINARY

PC$_5$ - Shallow (<1 m) to deep (>1 m) colluvial deposits form the soil parent materials of this map unit. The soils are sometimes lithic.
(Terrain Units: Cb, Cv, Cvb, Cvf, Cbv/$\frac{\underline{Cbv}}{F^{G}{}_{1}}$)

PC$_5$-FR$_2$ - Active floodplain soils of the Forcier Creek Association occupy a minor portion of this map unit.
(Terrain Unit: Cvb//FA$_1$)

PC$_5$-FR$_5$ - Level Forcier Creek Association soils occupy a minor portion of this map unit.
(Terrain Unit: Cvf//Fl)

PC$_5$-FR$_7$ - Forcier Creek Association soils subject to active stream channelling occupy a large portion of this map unit.
(Terrain Unit: Cva/FA$_{-E}$A)

PC$_5$-GR$_5$ - Shallow (<1 m) and deep (>1 m) Gundahoo River Association soils occupy a major portion of this map unit.
(Terrain Units: Cv = Mbv, Cbv/Mv, Cv/Mv)

PC$_5$-LA - Lapie Creek Association soils occupy a minor portion of this map unit.
(Terrain Unit: Cvf//Ov)

PC$_5$-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: Cvf/R, Cv/R)

PC$_6$-GR$_7$ - This map unit is subject to rapid mass wasting.
(Terrain Unit: Cv = Mv-R)

PRELIMINARY

PC_6-GR_7-R_3 - Gundahoo River Association soils and bedrock outcrops, both of which are subject to rapid mass wasting, occupy a significant portion of this map unit.
(Terrain Unit: Cv/Mv/R-R)

$PC6$-R_3-GR_7 - This map unit is subject to rapid mass wasting.
(Terrain Units: Cv/R = Mv-R, Cv/Rh-R plus Cv/R = Mv-R plus Cvb/Rh-R)

PC_7-HO_7-R_9 - This map unit is gullied and subject to rapid mass wasting.
(Terrain Unit: Cb/F^GS/R-RV)

PC_7-R_9 - This map unit is gullied and subject to rapid mass wasting.
(Terrain Units: Cv/R-VR, Cv/Rs-VR, Cv//Rs-Rv)

PC_8 - Colluvial blanket (>1 m) and fan deposits form the soil parent materials of this map unit.
(Terrain Unit: Cbf)

PC_9-HO_6 - This map unit is gullied, failing, and subject to rapid mass wasting.
(Terrain Unit: Cvb/F^Gs-VRF)

PC_{10}-R - This unit is subject to sclifluction.
(Terrain Units: Cv/Rs-S, Cvb//R-SR)

PC_{12}-GR_9 - This map unit is subject to solifluction and avalanching.
(Terrain Unit: Cav/Mv-SA)

A profile description of a Prochniak Creek Association soil is not available.

7.7.2 SWB Zone

The soil associations of the Rockv Mountains region which regularly occur in the spruce-willow-birch and alpine tundra biogeoclimatic zones include: Muncho Lake, Mt. Prudence, Sulfur Creek and Trout River associations.

ML Muncho Lake Association

Map Units of the Muncho Lake Association

ML-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: C/R, C//R)

ML-R-TO_2 - Bedrock outcrops and shallow ($<$1 m) Trout River Association soils occupy significant portions of this map unit.
(Terrain Units: C/M, C/Mv-V)

ML-TO - Trout River Association soils occupy a significant portion of this map unit. These soils are occasionally gullied.
(Terrain Units: C/M, C/Mv-V)

ML-TO_2 - Shallow ($<$1 m) Trout River Association soils occupy a significant portion of this map unit.
(Terrain Units: C//Mv, C = Mv, C/Mv)

ML_1 - This map unit consists of well drained, Eutric Brunisol soils develfoped in colluvial materials which are failing.
(Terrain Unit: C-F)

ML_1-R_6 - This map unit is gullied and failing.
(Terrain Unit: C/Rs-VF)

PRELIMINARY

ML_1-TO-R_6 - This map unit is gullied and failing.
(Terrain Unit: Cvb/Mb = Rs-VF)

ML_2 - Colluvial fan and apron deposits are the soil parent materials of this map unit.
(Terrain Units: Ca, Cf, Cbf)

ML_2-FR_2-LA - Level Forcier Creek Association and Lapie Creek Association soils occupy significant portions of this map unit.
(Terrain Unit: Cf = Fl/Ov)

ML_2-SU_2 - Apron shaped Sulfur Creek Association soils occupy a major portion of this map unit.
(Terrain Unit: Ca = Fa)

ML_2-TO_2 - Shallow ($<$1 m) Trout River Association soils occupy a large portion of this map unit.
(Terrain Unit: Ca/Mv)

ML_3 - Shallow ($<$1 m) to deep ($>$1 m) colluvial materials overlying bedrock make up the soil parent materials of this unit.
(Terrain Units: Cbv, Cv, Cvf, Cva)

ML_3-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: Cv/R, Cva//R, Cvb/R, Cv//R, Cva/R, Cv//Rs, Cvf//R, Cvf/R)

ML_3-R-TO_2 - Bedrock outcrops and shallow ($<$1 m) Trout River Association soils occupy significant amounts of this map unit.
(Terrain Unit: Cv/R = Mv)

PRELIMINARY

ML_3-TO_2 - Shallow (<1 m) Trout River Association soils occupy a significant portion of this map unit.
(Terrain Units: Cv//Mv, Cv/Mv)

ML_3-TO_2-R - Shallow (<1 m) Trout River Association soils and bedrock outcrops occupy significant portions of this map unit.
(Terrain Unit: Cv/Mv/R)

ML_4-MP_2 - Soils developed on steep undifferentiated materials plus minor amounts of terraced Mt. Prudence Association soils make up this map unit.
(Terrain Unit: Us//FG_t)

ML_5 - Shallow (<1 m) and deep (>1 m) colluvial materials form the soil parent materials of this map unit. The unit is gullied.
(Terrain Unit: Cvb-V)

ML_5-R_2 - This map unit is gullied.
(Terrain Units: Cvf//Rs-V, C/R-V, C-V/R, Cvb//Rs-V, Cv/R-V, Cv//Rs-V, Cvf/Rs-V)

ML_5-TO - Gullied Trout River Association soils occupy a minor portion of this map unit.
(Terrain Unit: Cfv//Mv-V)

ML_5-TO_2 - Shallow (<1 m) Trout River Association soils occupy a large portion of this map unit.
(Terrain Unit: C-V/Mv)

ML_6 - This map unit is subject to avalanching.
(Terrain Unit: C-A)

ML_6-R - This map unit is subject to avalanching as well as occasionally being gullied. (Terrain Units: C/Rs-AV, C = Rs-A, C/Rs-VA, C//Rs-A, C/Rs-A, C = Rs-AVS, C/R-A, Cv//Rs-A, Cvb//Rs-AV)

ML_6-R-MP_3 - This map unit is subject to avalanching. (Terrain Unit: Cfb//R = FG_h-A)

ML_6-R-TO_7 - This map unit is subject to avalanching. (Terrain Unit: Cv/Rs = Mv-VA)

ML_6-TO_2 - Shallow (<1 m) Trout River Association soils occupy a large portion of this map unit. (Terrain Units: C-A/Mv, C-Av/Mv)

ML_7 - This map unit is subject to solifluction and occasionally avalanching. (Terrain Units: C-S, Cvb-S, Cv-S, Cfb-SA)

ML_7-R - This map unit is subject to solifluction and rapid mass wasting with occasional gullying and avalanching. (Terrain Units: CV//Rs-SR, C/Rs-S, C/Rs-SR, C//Rs-SA, Cv/R-S, Cv = Rs-S, Cv//Rs-S, Cv/Rs-SV, Cv = R-SR, Cv/Rs-RS, Cv/R-SR, Cv//R-S, Cv//Rs-RS, Cv = Rs-SV, Cva/R-S, Cvf/Rs-SVA, Cv/Rs-VS)

ML_7-R-TO_{10} - This map unit is subject to solifluction. (Terrain Units: Cv//R-S plus Cv/Mv-S, Cv/Rs = Mv-S)

ML_7-TO_{10} - This map unit is subject to solifluction. (Terrain Units: Cv/Mv-S, Cvb//Mv-SV, Cvb/Mv-S, Cvb//Mv-S)

ML_8 - This map unit is gullied and subject to rapid mass wasting.
(Terrain Units: Cv-VR, Cva-VR)

ML_8-R9 - This map unit is gullied and subject to rapid mass wasting.
(Terrain Units: Cv/Rs-RV, Cv/Rs-VR, Cv-R-R, Cv//R-R, Cv/R-VR, Cvb/R-VR, Cv/R-R, Cv//Rs-R)

ML_8-R_{11} - This map unit is gullied, failing, and subject to solifluction.
(Terrain Unit: Cvb = Rs-VSR, Cv/Rs-SVR, Cv//Rs-VRS)

ML_8-TO_8 - This map unit is subject to rapid mass wasting and is frequently gullied.
(Terrain Units: Cv/Mv-R, Cvb//Mvb-VR, Cbv/Mb-VR)

ML_{11}-R_{12} - This map unit is gullied and subject to solifluction and rapid mass wasting.
(Terrain Units: Cv = Rs-VSR, Cv/Rs-SVR, Cv//Rs-VRS)

ML_{12}-R_8 - This map unit is gullied, failing and subject to rapid mass wasting.
(Terrain Unit: Cv/Rs-VRF, Cb-FV)

ML_{13}-R_{13} - This map unit is gullied and subject to rapid mass wasting and cryoturbation.
(Terrain Unit: Cva/R-VRC)

ML_{14}-TO_{11} - This map unit is gullied and subject to avalanching and rapid mass wasting.
(Terrain Unit: Cvb/Mv-VAR)

A profile description of an Eutric Brunisol soil of the Muncho Lake Association is given.

PRELIMINARY

LIARD RIVER SOILS

Page 1 of 2

Soil Association MUNCHO LAKE

Plot Number 9007-80

Terrain Classification fCv

N.T.S. Sheet 94N

Soil Moisture Subclass SUBHUMID

Soil Drainage RAPIDLY

Perviousness RAPIDLY

Free Water ABSENT

Flood Hazard NO HAZARD

Depth to: (cm.)
(- if absent)

a. water table —
b. rooting (effective) 29
c. root restricting layer 29
d. frozen layer —
e. bedrock 29
f. carbonate —
g. salinity —

Particle Size Analysis

Horizon Desig.	>2mm %	<2mm %	Sand %	Silt %	Clay %	Class
LF						
Ah						
Bm	7	93	20.1	59.3	20.6	SiL
Ahb						
R						

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca (me/100g)	Exchangeable Mg (me/100g)	Exchangeable Na (me/100g)	Exchangeable K (me/100g)	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
LF														
Ah														
Bm	5.7	1.07	0.077	2.9	0.2	3.8	1.6	0.13	0.07	0.63	0.55	37		
Ahb														
R														

LIARD RIV **PRELIMINARY**

Page 2 of 2

Soil Association MUNCHO LAKE

Plot Number 9007-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5 cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
LF	2-0	0	1	C	S																
Ah	0-9	2	10	G	I	5	30	S	30	S	40	S	sil	WM	FM	GR					
Bm	9-16	9	16	D	W	5	30	S	30	S	40	S	si	W	F	SGR					
Ahb*	16-29	2	8	A	I	5	30	S	30	S	40	S	l	W	F	GR					
R	29+																				
* Ahb	APPEARS TO BE ROOT MAT ON TOP OF BEDROCK																				

Horizon Desig.	Mst. D M W	Consist.				Colour 1		Colour 2		Mottles					Bound. Dis. C S D	Roots 1				Roots 2			
		dry	moist	wet	plast	aspect		aspect		Ab. F C M	Si. F M C	Co. F D P	Colour aspect			Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX	Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX
LF																							
Ah	M		2	2	2	1	10 YR 3/3									P	F	O	MX				
Bm	M		2	2	2	1	10 YR 5/4									P	F	O	MX				
Ahb	M		2	2	2	1	10 YR 3/2									P	F	H	MX				
R																							

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material		Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W M S	Kind 1	Kind 2	Decom. N S M H	Hard. S SH H VH	Vol. 0-1-2-3-4					
LF																						
Ah	P	F	R	EX	CO	D	I	M														
Bm	P	F	R	EX	CO	D	I	M														
Ahb	P	F	R	MX	CO	D	I	M														
R																						

PRELIMINARY

MP Mt. Prudence Association

Map Units of the Mt. Prudence Association

MP_1 - This map unit is composed of well drained, Eutric Brunisol soils developed on glaciofluvial esker and kame deposits. (Terrain Units: $F^{G}r$, $F^{G}bh$)

MP_1-LA - Lapie Creek Association soils occupy a minor portion of this map unit. (Terrain Unit: $F^{G}rh//Ovb$)

MP_2 - Soils of this map unit are developed on terraced glaciofluvial deposits sometimes overlying bedrock.
(Terrain Units: $F^{G}t$, $F^{G}st$, $\frac{F^{G}t}{R}$)

MP_4 - Level glaciofluvial deposits comprise soil parent materials of this map unit.
(Terrain Unit: $F^{G}l$)

MP_5 - The glaciofluvial deposits of this map unit are kettled.
(Terrain Units: $F^{G}l\text{-}H$, $F^{G}bl\text{-}H$, $F^{G}rh\text{-}H$)

A profile description of a Mt. Prudence Association soil is not available.

PRELIMINARY

SU Sulphur Creek Association

Map Units of the Sulphur Creek Association

SU_1 - This map unit is composed of well to imperfectly drained, Regosol soils developed on active floodplain deposits.
(Terrain Unit: FA_1)

SU_2 - The soils of this map unit are well drained, Eutric Brunisol soils, developed on fluvial apron deposits.
(Terrain Unit: Fa)

A profile description of a Regosol soil of the Sulphur Creek Association is given.

PRELIMINARY

LIARD RIV... SOILS

Page 1 of 2

Soil Association
SULPHUR CREEK

Plot Number
9040-80

Terrain Classification
bgs $F^{A}1$

N.T.S. Sheet
94N

Soil Moisture Subclass
HUMID

Soil Drainage
RAPIDLY

Perviousness
RAPIDLY

Free Water
ABSENT

Flood Hazard
FREQUENT + IRREGULAR

Depth to: (cm.)
(- if absent)

a. water table	—
b. rooting (effective)	20
c. root restricting layer	—
d. frozen layer	—
e. bedrock	—
f. carbonate	SURFACE
g. salinity	—

Particle Size Analysis

Horizon Desig.	>2mm %	<2mm %	Sand %	Silt %	Clay %	Class
Ck	70	30	82.9	13.1	4.0	ls

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca (me/100g)	Exchangeable Mg (me/100g)	Exchangeable Na (me/100g)	Exchangeable K (me/100g)	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppo)
Ck	7.9	0.30	0.090	7.2	41.1	14.0	1.0	0.06	0.10				4	50

LIARD RIV **PRELIMINARY**

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Soil Association SULPHUR CREEK

Plot Number 9-40-82

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5 cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod	Grade	Class	Kind	Kind Mod.
Ck	0+					85	55	R	45	R											

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles					Dis. Bound.	Roots 1				Roots 2			
										Ab.	Si.	Co.	Colour			Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast.	aspect		aspect		F C M	F M C	F D P	aspect		C S D	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
Ck																							

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material		Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
													Kind	Kind	Decom	Hard.	Vol.					
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W M S	1	2	N S M H	S SH H VH	0-4					
Ck												M										

TO Trout River Association

Map Units of the Trout River Association

TO - This map unit consists of well to imperfectly drained, Gray Luvisol soils developed on morainal materials which are gullied.
(Terrain Units: Mbv-V, Mb-V

TO-ML - Muncho Lake Association soils occupy a large portion of this map unit.
(Terrain Units: Mbv-V/C, Ms-V/C)

TO-ML$_5$ - Gullied Muncho Lake Association soils occupy a large portion of this map unit.
(Terrain Units: Mvb/cf-V, Mbv/Cfa-V)

TO$_1$ - Deep (>1 m) mantled morainal materials form the soil parent materials of this map unit.
(Terrain Unit: Mb)

TO$_2$ - Shallow (<1 m) to deep (>1 m) morainal materials overlying bedrock from the soil parent materials of this map unit.
(Terrain Units: Mv, Mvb)

TO$_2$-ML - Muncho Lake Association soils occupy a significant portion of this map unit.
(Terrain Units: Mv/C, Mv = C)

TO$_2$-ML$_3$ - Shallow (<1 m) Muncho Lake Association soils occupy a large portion of this map unit.
(Terrain Unit: Mv/Cv)

TO$_2$-ML$_3$-R - Shallow (<1 m) Muncho Lake Association soils and bedrock outcrops occupy significant portions of this map unit.
(Terrain Units: Mv//Cv = R, Mv/Cv = R, Mv = Cv/R)

PRELIMINARY

TO_2-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: Mv/R, Mv//Rm, Mvb//R)

TO_2-R-ML_3 - Bedrock outcrops and shallow (< 1 m) Muncho Lake Association soils occupy significant portions of this map unit.
(Terrain Unit: Mvb//R = Cv)

TO_3 - This map unit consists of deep (>1 m) to shallow (<1 m) and occasionally subdued morainal materials which form the soil parent materials.
(Terrain Unit: Mbv, Mbm)

TO_3-ML - Muncho Lake Association soils occupy a minor portion of this map unit.
(Terrain Unit: Mbv//C)

TO_4-SU_1 - Subdued Trout River Association soils with major portions of level Sulfur Creek Association soils occupy this map unit.
(Terrain Unit: Mm = FA_1)

TO_5 - The soils of this map unit have developed on morainal materials which are dissected by glacial meltwater channels.
(Terrain Units: Mb-E^G, $\frac{\text{Mb-}E^G}{R}$)

TO_5-ML_9 - Muncho Lake Association soils dissected by glacial meltwater channels occupy a minor portion of this map unit.
(Terrain Unit: Mb//Cf-E^G)

TO_6 - This map unit is subject to nivation.
(Terrain Unit: Mm-N)

TO_9 - This map unit is subject to solifluction and cryoturbation.
(Terrain Unit: Mv-SC)

TO_9-ML_{10} - This map unit is subject to solifluction and cryoturbation.
(Terrain Unit: Mv-Cv-SC)

TO_{10} - The map unit is subject to solifluction.
(Terrain Unit: Mbs-S)

A profile description of a Trout River Association soil is not available.

PRELIMINARY

7.8 SOILS OF THE ROCKY MOUNTAIN FOOTHILLS

The features of the Rocky Mountain Foothills physiographic region are described in Chapter 2, Section 2.5 of this report.

The soil parent materials occuring most commonly in this region are colluvial deposits with lesser amounts of morainal, fluvial, glaciofluvial and minor lacustrine and organic deposits. Bedrock outcrops are very common and frequently steep.

Terrain of this region is gently rolling to steep especially where bedrock outcrops occur and where major streams have incised their banks.

The boreal white and black spruce and the spruce-willow-birch biogeoclimatic zones occur throughout this region. The BWBS zone is the most commonly occuring.

Soil associations defined for this region include: the Crusty Creek, Eight Mile Creek, Foothills, Hell Gate, Scaffold Creek, Sentinel, Ewe Mountain and McLearn Mountain associations.

7.8.1 BWBS Zone

The soil associations most frequently occuring in the boreal white and black spruce biogeoclimatic zone are: the Crusty Creek, Eight Mile Creek, Foothills, Hell Gate, Scaffold Creek and Sentinel associations.

CS Crusty Creek Association

Map Units of the Crusty Creek Association.

CS_1 - This map unit consists of well drained, Eutric Brunisol soils developed on shallow ($<$1 m) and occasionally deep ($>$1 m) morainal materials overlying bedrock. The soils are frequently lithic.
(Terrain Units: Mv, Mvb)

CS_1-HA - Hell Gate Association soils occupy a large portion of this map unit.
(Terrain Unit: Mvb/Cs)

CS_1-HA_4 - Shallow ($<$1 m) Hell Gate Association soils occupy a significant portion of this unit.
(Terrain Units: Mv = Cv, Mvb = Cv, Mvb//Cv)

CS_1-HA_4-R - Shallow ($<$1 m) Hell Gate Association soils and bedrock outcrops occupy significant portions of this map unit.
(Terrain Unit: Mv = Cv/R)

CS_1-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: Mv/R, Mvb//R, Mv//R)

CS_2 - Soils derived from deep ($>$1 m) and shallow ($<$1 m) morainal materials overlying bedrock make up this map unit.
(Terrain Unit: Mvb)

CS_2-EM_1-SN - Ewe Mountain Association and Sentinel Association soils occupy a large segment of this map unit.
(Terrain Unit: Mb/Fl = Ov)

CS_2-HA_4 - Shallow (< 1 m) Hell Gate Association soils occupy a significant portion of this map unit.
(Terrain Units: Mbv//Cv, Mbv/Cvf, Mbv/Cv)

CS_2-SN - Sentinel Association soils occupy a minor portion of this map unit.
(Terrain Unit: Mb//Ov)

CS_4-HA_6 - Gullied Crusty Creek Association and Hell Gate Association occupy this unit.
(Terrain Unit: Mbv/Cv-V)

A profile description of a Crusty Creek Association soil is not available.

PRELIMINARY

EM Eight Mile Creek Association

Map Units of the Eight Mile Creek Association

EM - This map unit is composed of well to imperfectly drained, Regosol or Gleysol soils developed on fluvial materials.
(Terrain Units: Ff/Fts, Fl/Ff)

EM_1 - The soils of this map unit have developed on terraced, steep, and level fluvial deposits.
(Terrain Units: Ft, Fs, Fl)

EM_1-HA_2 - Fan shaped Hell Gate Association soils occupy a major portion of this map unit.
(Terrain Unit: Flf = Cf)

EM_2 - This map unit is subject to avalanching.
(Terrain Unit: Fa-A)

EM_3 - Soils of this map unit have developed on fan shaped fluvial deposits.
(Terrain Units: Ff, Ffl)

EM_3-SN - Sentinel Association soils occupy a large segment of this map unit.
(Terrain Unit: Ff/Ov)

EM_4 - The soils of this unit are well to imperfectly drained, Regosol soils developed on fluvial materials which are being actively channelled.
(Terrain Units: $F^A{}_1$-E^A, Fft/Fl-E^A, Ftl-E^A)

A profile description of a Regosol soil of the Eight Mile Creek Association is given.

PRELIMINARY

LIARD RIVER SOILS

Page 1 of 2

Soil Association EIGHT MILE CREEK

Plot Number 9008-90

Terrain Classification gsFh

N.T.S. Sheet 92N

Soil Moisture Subclass SUBHUMID

Soil Drainage WELL

Perviousness MODERATELY

Free Water ABSENT

Flood Hazard RARE

Depth to: (cm.)
(- if absent)

a. water table —
b. rooting (effective) >30
c. root restricting layer >30
d. frozen layer —
e. bedrock —
f. carbonate 4
g. salinity —

Particle Size Analysis

Horizon Desig.	>2mm %	<2mm %	Sand %	Silt %	Clay %	Class
L						
Of						
Ah						
Ck	35	65	31.6	50.8	17.6	1

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca	Exchangeable Mg (me/100g)	Exchangeable Na	Exchangeable K	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
L														
Of														
Ah														
Ck	8.0												3	100

LIARD RIV **PRELIMINARY**

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Soil Association EIGHT MILE CREEK

Plot Number 9002-20

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
L	19-10	6	10	D	S																
Of	10-0	8	12	G	S																
Ah	0-4	0	4	C	S																
Ck	4-30+					50	40	S	40	S	20	S	gsil	W	FM	GR					

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles						Roots 1				Roots 2			
										Ab.	Si.	Co.	Colour		Bound. Dis.	Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast	aspect		aspect		F C M	F M C	F D P	aspect		D C G S D	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
L																							
Of																							
Ah																							
Ck	M		2	2	2	1	5YR 2.5/1									P	F	O	MX				

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.		Woody Material			Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
													Kind	Kind	Decom.	Hard.	Vol.					
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W M S	1	2	N S M H	S SH H VH	0 1 2 3 4					
L													4		S	SH	2	—	01			
Of													6		M	SH	3	0.5	07			
Ah																						
Ck	A	F	R	EX	CO	D	I	M				S										

PRELIMINARY

FO Foothills Association

Map Units of the Foothills Association

FO - This map unit consists of moderately well drained, Gray Luvisol soils developed on lacustrine deposits.
(Terrain Unit: Lb)

FO-SN - Sentinel Association soils occupy a significant portiion of this map unit.
(Terrain Units: Lb//Ov, Lb/Ov)

FO_1 - This map unit is gullied.
(Terrain Unit: Lb-V)

A profile description of a Foothills Association soil is not available.

HA Hell Gate Association

Map Units of the Hell Gate Association

HA_1 - This map unit consists of well to rapidly drained, Regosol or Eutric Brunisol soils developed on colluvial materials ($>$1 m) deep overlying bedrock.
(Terrain Units: Cb, Cbv)

HA_1-CS_2 - Deep ($>$1 m) to shallow ($<$1 m) Crusty Creek Association soils occupy a large portion of this map unit.
(Terrain Units: Cbf/Mbv, Cbv/Mbv)

HA_1-EM_1-R - Eight Mile Creek Association soils and bedrock outcrops occupy significant portions of this map unit.
(Terrain Unit: Cb/Fts = Rs)

HA_1-EM_5 - Eight Mile Creek Association soils which have formed an active floodplain deposits occupy a minor portion of this unit.
(Terrain Unit: Cbv//FA_2)

HA_2 - Soils formed on colluvial fan and apron deposits occupy this map unit.
(Terrain Units: Cfb, Cfv, Ca, Cf, Cfa)

HA^2-CS_2 - Deep ($>$1 m) Crusty Creek Association soils occupy a significant portion of this map unit.
(Terrain Units: Ca = Mb, Cfb//Mb)

HA_2-EM_1 - Level Eight Mile Creek Association soils occupy a minor segment of this map unit.
(Terrain Unit: Cf//Fl)

HA$_2$-EM$_3$ - Fan shaped Eight Mile Creek Association soils occupy a significant portion of this map unit.
(Terrain Units: Cfv/Ff, Cf = Ffl)

HA$_2$-R - Bedrock outcrops occupy a minor segment of this map unit.
(Terrain Unit: Cfb//R)

HA$_2$-SA$_1$ - Scaffold Creek Association soils which are terraced occupy a minor portion of this map unit.
(Terrain Unit: Cfa//FG$_t$)

HA$_2$-SN - Sentinel Association soils occupy a large portion of this map unit.
(Terrain Units: Ca/Ov, Cav/Ov)

HA$_3$ - This map unit is subject to rapid mass wasting.
(Terrain Unit: Cv-R)

HA$_3$-CS$_3$ - This map unit is subject to rapid mass wasting.
(Terrain Unit: Cvb/Mv-R)

HA$_3$-CS$_3$-R - The soils and bedrock outcrops of this map unit are subject to rapid mass wasting.
(Terrain Units: Cv = Mv/R-R, Cv/Mv/R-R)

HA$_3$-R - This map unit is subject to rapid mass wasting.
(Terrain Units: Cv = R-R, Cv//R-R, Cv//Rs-R)

HA$_4$ - Soils of this map unit are developed on shallow ($<$1 m) and occasionally deep ($>$1 m) mantled, fan and/or apron shaped colluvial materials.
(Terrain Units: Cvb, Cva//Mv, Cvf, Cv, Cvs, Cva)

HA_4-CS_1 - Shallow (<1 m) Crusty Creek Association soils occupy a significant portion of this map unit.
(Terrain Units: Cv/Mv, Cv = Mv, Cvb/Mvb)

HA_4-CS_1-R - Shallow (<1 m) Crusty Creek Association soils and bedrock outcrops occupy significant portions of this map unit.
(Terrain Unit: Cv/Mv = R)

HA_4-CS_2 - Deep (>1 m) Crusty Creek Association soils occupy a large portion of this map unit.
(Terrain Unit: Cv/Mb)

HA_4-EM_3 - Fan-shaped Eight Mile Creek Association soils occupy a minor portion of this map unit.
(Terrain Unit: Cv//Ffl)

HA_4-R - Bedrock outcrops occupy a large portion of this map unit.
(Terrain Units: Cvf/R, Cvb//Rs, Cv/Rs, Cv//Rs, Cva/Rs, Cva/R)

HA_5-R_1-EM_5 - The soils and bedrock outcrops of this map unit are failing.
(Terrain Unit: Cbv/Rs/Fs-F)

HA_6-R - The soils and bedrock outcrops of this map unit are gullied.
(Terrain Units: Cvb/R-V, Cv/Rs-V, Cv = Rs-V, Cva//Rs-V)

HA_7 - This map unit is gullied and subject to rapid mass wasting.
(Terrain Unit: Cv-VR)

HA_7-R_9 - The soils and bedrock outcrops of this map unit are gullied and subject to rapid mass wasting.
(Terrain Unit: Cv = Rs-VR)

HA_8 - This map unit is subject to solifluction. (Terrain Unit: Cv-S)

HA_9-R_{12} - The soils and bedrock outcrops of this map unit are gullied and subject to rapid mass wasting and solifluction. (Terrain Unit: Caf/Rs-VRS)

HA_{10} - This map unit is gullied and subject to avalanching. (Terrain Unit: Cfb-AV)

HA_{10}-R - This map unit is gullied and subject to avalanching. Bedrock outcrops occupy a large portion of the unit. (Terrain Unit: Cva/Rs-VA)

HA_{13}-R_6 - This map unit is failing and gullied. (Terrain Unit Cv = Rs-FV)

HA_{14}-R_8 - This map unit is failing, gullied and subject to rapid mass wasting. (Terrain Unit: Cbv//Rs-FVR)

HA_{15} - This map unit is subject to avalanching and rapid mass wasting.

A profile description of a Hell Gate Association soil is not available.

SA Scaffold Creek Association

Map Units of the Scaffold Creek Association

SA - This map unit consists of well to rapidly drained, Eutric Brunisol soils developed on glaciofluvial materials which are mantled over other unconsolidated materials or bedrock.
(Terrain Unit: FG_b)

SA_1 - Soils of this map unit have developed on terraced, level and steep glaciofluvial deposits.
(Terrain Units: FG_{ts}, FG_{st}, FG_t, FG_l, FG_s)

SA_2 - This map unit is kettled.
(Terrain Units: FG_{tm-H}, FG_{hr-H})

SA_3 - The soils of this map unit are developed on esker and kame glaciofluvial materials.
(Terrain Unit: FG_{hr})

SA_4 - This map unit is failing and gullied.
(Terrain Unit: FG_s-FV)

A profile description of a Scaffold Creek Association soil is not available.

SN Sentinel Association

Map Units of the Sentinel Association

SN - This map unit consists of very poorly drained, Mesisol soils developed on organic accumulations.
(Terrain Units: Ov, Ovb)

SN-EM_3 - Fan shaped Eight Mile Creek Association soils occupy a major portion of this map unit.
(Terrain Unit: Ov = Ff)

A profile description of a Sentinel Association soil is not available.

7.8.2 SWB Zone

The soil associations defined for the spruce-willow-birch biogeoclimatic zones of the Rocky Mountain Foothill region include: the Ewe Mountain, and McLearn Mountain Associations.

EW - Ewe Mountain Association

Map Units of the Ewe Mountain Association

EW_1 - The soils of this map unit are shallow (<1 m), well drained, Eutric Brunisol soils developed on morainal materials overlying bedrock. This map unit is subject to solifluction.
(Terrain Unit: Mv-S)

EW_2 - The soils of this unit have developed on deep (>1 m) to shallow (<1 m) morainal material overlying bedrock.
(Terrain Unit: Mbv)

EW_2-R - Bedrock outcrops occupy a minor segment of this map unit.
(Terrain Unit: Mbv//R)

EW_2-SN - Sentinel Association soils occupy a major portion of this map unit.
(Terrain Unit: Mbv = Ov)

EW_4 - Soils of this map unit have developed on shallow (<1 m) and occasionally deep (>1 m) morainal materials overlying bedrock.
(Terrain Units: Mv, Mvb)

EW_4-MR_5 - Shallow (<1 m) McLearn Mountain Association soils occupy a large portion of this map unit.
(Terrain Unit: Mv/Cv)

EW4-MR5-R - Shallow (<1 m) McLearn Mountain Association soils and bedrock outcrops occupy significant portions of this unit.
(Terrain Unit: Mv = Cv/R)

EW4-MR5-SN1 - Shallow (<1 m) McLearn Mountain Association and Sentinel Association soils occupy significant portions of this map unit.
(Terrain Units: Mv/Cv//Ov, Mv = Cv//Ov)

EW4-R-MR5 - Bedrock outcrops and McLearn Association soils occupy significant portions of this map unit.
(Terrain Units: Mv/R = Cva, Mv/Rh = Cv)

EW5-R - This map unit is gullied and failing.
(Terrain Unit: Mv//R-VF)

EW6-MR9 - This map unit is gullied.
(Terrain Unit: Mbv/Cv-V)

A profile description of a Ewe Mountain Association soil is not available.

MR McLearn Mountain Association

Map Units of the McLearn Mountain Association

MR$_1$-EN$_3$-R$_9$ - This map unit is subject to mass wasting and is gullied.
(Terrain Unit: Cv/Mv = R-RV)

MR$_1$-R$_9$ - This map unit is gullied and subject to rapid mass wasting.
(Terrain Units: Cv/Rs-VR, Cv//Rs-VR)

MR$_1$-R$_9$-EW$_3$ - This map unit is gullied and subject to rapid mass wasting.
(Terrain Unit: Cvbv//R = Mv-RV)

MR$_2$ - This map unit consists of well drained, Eutric Brunisol soils developed on deep (>1 m) and occasionally apron shaped or subdued colluvial materials overlying bedrock.
(Terrain Units: Cba, Cbm)

MR$_2$-R - Bedrock outcrops occupy a large portion of this map unit.
(Terrain Unit: Cbv/Rs)

MR$_3$-EW$_7$ - Soils of this map unit are subject to solifluction and rapid mass wasting.
(Terrain Unit: Cva/Mv-SR)

MR$_4$-R$_8$ - This map unit is gullied, failing and subject to rapid mass wasting.
(Terrain Unit: Cv/Rs-VRF)

MR$_5$ - The soils of this map unit have devloped on shallow (<1 m) colluvial deposits which occasionally include minor amounts of shallow morainal materials.
(Terrain Units: Cvf//Mv, Cv, Cvs)

MR_5-EW_4 - Shallow (<1 m) to deep (>1 m) Ewe Mountain Association soils occupy a significant portion of this map unit.
(Terrain Units: Cv/Mvb, Cvb/Mvb, Cv = Mv, Cv/Mv)

MR_5-EW_4-R - Shallow (<1 m) Ewe Mountain Association soils and bedrock outcrops occupy significant portions of this map unit.
(Terrain Unit: Cv/Mv/R)

MR_5-R - Bedrock outcrops occupy a significant portion of this map unit.
(Terrain Units: Cv//R, Cv//Rs, Cv/Rs, Cvs//R, Cv = R)

MR_5-R-EW_4 - Bedrock outcrops and shallow (<1 m) Ewe Mountain Association soils occupy significant portions of this map unit.
(Terrain Unit: Cv/R/Mv)

MR_6 - The soils of this map unit are gullied and subject to solifluction.
(Terrain Unit: Cbv/Cv-VS)

MR_7-EW_5-R_6 - This map unit is gulled and failing.
(Terrain Unit: Cv = Mv//R-VS)

MR_8 - Soils of this map unit are subject to solifluction.
(Terrain Unit: Cv-S)

MR_8-EW_1 - This map unit is subject to solifluction.
(Terrain Unit: Cv = Mv-S)

MR_8-R - The soils of this map unit are subject to solifluction.
(Terrain Units: Cvb/R-S, Cv/Rs-S, Cv/R-S)

MR$_9$-R - This map unit is gullied.
(Terrain Units: Cvb/R-V, Cvb = R-V, Cv/Rs-V, Cva//Rs-V, Cv//Rs-V)

MR$_9$-R-EW$_6$ - This map unit is gullied.
(Terrain Unit: Cv/R/Mv-V)

MR$_{10}$ - Soils of this unit are subject to solifluction and cryoturbation.
(Terrain Unit: Cv-SC)

MR$_{11}$ - Colluvial fan deposits and sometimes shallow (<1 m) or deep (>1 m) mantled colluvial deposits overlying bedrock are the soil parent materials of this map unit.
(Terrain Units: Cfv, Cfb)

MR$_{11}$-R - Bedrock outcrops occupy a minor portion of this map unit.
(Terrain Unit: Caf//R)

MR$_{11}$-SN$_1$ - Sentinel Association soils occupy a minor segment of this unit.
(Terrain Unit: Ca//Ov)

MR$_{12}$-R$_{11}$-EW$_8$ - This map unit is gullied, failing and subject to solifluction.
(Terrain Unit: Cv/Rs/Mv-VFS)

MR$_{13}$-R$_3$ - This map unit is subject to rapid mass wasting.
(Terrain Units: Cv/R-R, Cv/Rs-R)

MR$_{14}$ - Soils of this map unit are subject to avalanching.
(Terrain Unit: Cf-A)

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MR_{16}-R_{14} - This map unit is subject to rapid mass wasting and avalanching.
(Terrain Unit: Cv/Rs-RA)

A profile description for a McLearn Mountain Association soil is not available.

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7.9 SOILS OF THE ROCKY MOUNTAIN TRENCH

The features of the Rocky Mountain Trench physiographic region are described in Chapter 2, Section 2.9 of this report.

Soil parent materials of this region are mainly morainal, glaciofluvial and fluvial with lesser amounts of colluvial, aeolian, organic and lacustrine deposits.

The terrain is flat to gently rolling and occasionally steep where incised by major streams.

The boreal white and black spruce biogeoclimatic zone is most commonly found in this Rocky Mountain Trench region in this survey area.

Soil associations defined for this region include: the American, Grizzly, Guiding, Hunting, Moose, Scoop Lake and Tourist associations.

7.9.1 BWBS Zone

The soil associations listed above all occur within the boreal white and black spruce biogeoclimatic zone.

AM American Association

Map Units of the American Association

AM - This map unit consists of rapidly drained, Regosol soils developed on steep, undifferentiated unconsolidated deposits. (Terrain Unit: Us)

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AM_1 - Soils of this map unit have developed on colluvial apron deposits.
(Terrain Unit: Ca)

A profile description of an American Association soil is not available.

GZ Grizzly Association

Map Units of the Grizzly Association

GZ_1 - This map unit consists of imperfectly to poorly drained, Regosol or Gleysol soils developed from active floodplain deposits.
(Terrain Unit: FA_1)

GZ_2 - Soils of this map unit have developed on fluvial fan deposits.
(Terrain Unit: Ff)

GZ_2-SO - Scoop Lake Association soils occupy a large portion of this map unt.
(Terrain Unit: Ff/M)

GZ_3 - Terraced fluvial deposits form the soil parent materials of this map unit.
(Terrain Unit: Ft)

GZ_4 - Level fluvial deposits make up the soil parent materials of this map unit.
(Terrain Unit: Fl)

A profile description of a Eutric Brunisol soil of the Grizzly Association is given.

PRELIMINARY

LIARD RIVE[illegible] SOILS

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Soil Association GRIZZLY

Plot Number 9011-80

Terrain Classification sFl

N. T. S. Sheet 94M

Soil Moisture Subclass SUBHUMID

Soil Drainage WELL

Perviousness RAPIDLY

Free Water ABSENT

Flood Hazard RARE

Depth to: (cm.)
(- if absent)

a. water table	–
b. rooting (effective)	58
c. root restricting layer	–
d. frozen layer	–
e. bedrock	–
f. carbonate	58
g. salinity	–

Particle Size Analysis

Horizon Desig.	>2 mm %	<2 mm %	Sand %	Silt %	Clay %	Class
Ah						
Bf	1	99	71.1	24.0	4.9	Sl
Bm		100	84.1	11.4	4.5	lS
BC						
Ahbk						
IICk		100	97.4	2.3	0.3	S

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca (me/100g)	Exchangeable Mg (me/100g)	Exchangeable Na (me/100g)	Exchangeable K (me/100g)	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
Ah														
Bf	7.0	1.21	0.069	25.6	1.3	6.3	1.0	0.10	0.15	0.13	0.12	92		
Bm	6.9	0.30	0.025	15.3	<.1	3.4	0.6	0.12	0.10	0.10	0.10	19		
BC														
Ahbk														
IICk	8.0												2	130

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Soil Association GRIZZLY

Plot Number 7011-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod.	Grade	Class	Kind	Kind Mod.
Ah	0-3	1	4	C	I								sl	M	M	PL					
Bf	3-9	4	7	G	W								sl	WM	M	SBK					
Bm	9-19	9	12	D	S								ls	W	M	SBK					
BC	19-58	38	40	A	S								ls			SG					
Ahbk	58-61	2	4	C	S								sl	M	M	PL					
IICk	61-80+												ls			MA		WM	M	SBK	

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles						Roots 1				Roots 2			
										Ab.	Si.	Co.	Colour		Bound. Dis.	Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist.
	D M W	dry	moist	wet	plast.	aspect		aspect		F C M	F M C	F D P	aspect		D C S D	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
Ah	M		3	2	2	1	10YR 2/1									P	F	O	MX	F	C	H	MX
Bf	M		2	2	2	1	7.5YR 3/4									P	F	O	MX				
Bm	M		2	2	1	1	7.5YR 4/6									F	M	O	MX				
BC	M		1	1	1	1	2.5YR 4/4																
Ahbk	M		2	2	2	1	10YR 2/2																
IICk	M		1	1	1	1	10YR 3/3																

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material		Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W M S	Kind 1	Kind 2	Decom N S M H	Hard. S SH H VH	Vol. 0-1-2-3-4					
Ah	P	F	H	EX	CO	D	T	M														
Bf	P	F	R	EX	CO	D	I	M														
Bm	P	F	R	MX	CO	D	I	H														
BC	P	M	R	MX	CO	D	I	H														
Ahbk	P	F	H	EX	CO	D	I	M				S										
IICk	F	F	R	EX	CO	D	I	M				S										

GU Guiding Association

Map Units of the Guiding Association

GU$_1$ - The soils of this map unit are well drained, Eutric Brunisol soils developed on glaciofluvial deposits.
(Terrain Unit: FG$_t$)

GU$_2$ - This map unit is kettled.
(Terrain Unit: FG$_1$-H)

GU$_2$-SO$_3$ - The soils of this map unit are kettled.
(Terrain Unit: FG$_{hr}$/M-H)

A profile description of a Guiding Association soil is not available.

PRELIMINARY

HN Hunting Association

Map Units of the Hunting Association

HN_1 - This map unit consists of well drained, Regosol soils developed on active sand dunes. (Terrain Unit: $E^{A}r$)

HN_2 - Soils of this map unit are well drained, Eutric Brunisol soils, developed on stabilized sand dunes. (Terrain Unit: Er)

A profile description of a Regosol soil of the Hunting Association is given.

PRELIMINARY

LIARD RIVER SOILS

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Soil Association	**Plot Number**
HUNTING	9014-80
Terrain Classification	**N.T.S. Sheet**
sEhr - A	94M
Soil Moisture Subclass	**Soil Drainage**
SUBHUMID	RAPIDLY

Perviousness	**Free Water**	**Flood Hazard**
RAPIDLY	ABSENT	NO HAZARD

Depth to: (cm.)
(- if absent)

a. water table —
b. rooting (effective) 20
c. root restricting layer —
d. frozen layer —
e. bedrock —
f. carbonate —
g. salinity SURFACE

Particle Size Analysis

Horizon Desig.	>2mm %	<2mm %	Sand %	Silt %	Clay %	Class
Ck_1						
Ck_2		100	94.6	1.0	4.4	S

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca (me/100g)	Exchangeable Mg (me/100g)	Exchangeable Na (me/100g)	Exchangeable K (me/100g)	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
Ck_1														
Ck_2	8.5	0.14	0.015	8.5	0.4	16.2	0.4	0.10	0.06				2	120

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PRELIMINARY

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Soil Association HUNTING

Plot Number 9014-80

Horizon Desig.	Horizon Depth cm	Horizon Thickness cm Min.	Horizon Thickness cm Max.	Horizon Boundary Dist.	Horizon Boundary Form	Coarse Fragment Descript. % by vol.	Gravel <7.5cm %	Gravel Type	Cobbles 7.5 - 25 cm %	Cobbles Type	Stones >25 cm %	Stones Type	Soil Texture < 2mm	Structure Primary Grade	Primary Class	Primary Kind	Primary Kind Mod	Secondary Grade	Secondary Class	Secondary Kind	Secondary Kind Mod.
Ck1	0-20	17	22	D	S											MA				SGR	
Ck2	20-90+												ls			MA				SGR	

Horizon Desig.	Mst. D M W	Consist. dry	moist	wet	plast.	Colour 1 aspect	Colour 1	Colour 2 aspect	Colour 2	Mottles Ab. F C M	Si. F M C	Co. F D P	Colour aspect	Colour	Bound. Dis. D S C D	Roots 1 Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX	Roots 2 Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX
Ck1	M		1	1	1	1	2.5Y 4/4									P	F	O	MX				
Ck2	M		1	1	1	1	2.5Y 4/4									F	F	O	MX				

Horizon Desig.	Pores Ab. V F P A	Size V F M C	Ori. V H O R	Dist. IN EX MX	Cont. CO DC	Mor. S D C	Type V I T	Hor. Por. S M H	Clay Films Freq. F C M CS	Thi. TN MTK TK VTK	Loc. 0 to 8	Effer. Deg. VW W M S	Organic Material Description Material Composit. Kind 1	Kind 2	Decom. N S M H	Woody Material Hard. S SH H VH	Vol. 0-1-2-3-4	Pyro. Index	von Post Scale	Fiber Analysis Unrubbed Fiber %	Rubbed Fiber %	Pyro. Index
Ck1	P	F	R	MX	CO	D	I	H				S										
Ck2	F	F	R	MX	CO	D	I	H				S										

MO Moose Association

Map Units of the Moose Association

MO - This map unit is composed of very poorly drained, Mesisol soils developed on organic accumulations.
(Terrain Units: Obv, $\frac{\text{Ov}}{\text{Ft}}$, $\frac{\text{Ov}}{\text{Fa}}$, $\frac{\text{Obv}}{\text{Fl}}$)

A profile description of a Moose Association soil is not available.

SO Scoop Lake Association

Map Units of the Scoop Lake Association

SO - This map unit consists of well to imperfectly drained, Eutric Brunisol soils developed on morainal materials.
(Terrain Unit: M)

SO-R - Bedrock outcrops occupy a large portion of this map unit.
(Terrain Unit: M/R)

SO_1 - Deep ($>$1 m) morainal materials overlying bedrock form the soil parent materials of this unit.
(Terrain Unit: Mb)

SO_2 - Deep ($>$1 m) and shallow ($<$1 m) morainal materials overlying bedrock form the soil parent materials of this map unit.
(Terrain Unit: Mvb)

SO_3 - This map unit is kettled.
(Terrain Units: Mb-H, M-H)

SO_4 - Drumlinized morainal materials form the soil parent materials of this map unit.
(Terrain Unit: Mr, Mm)

SO_5 - Soils of this map unit have developed in morainal materials which are dissected by glacial meltwater channels.
(Terrain Unit: Mb-E^G)

A profile description of a Eutric Brunisol soil of the Scoop Lake Association is given.

PRELIMINARY

LIARD RIVER SOILS

Page 1 of 2

Soil Association
SCOOP LAKE

Plot Number
9009-80

Terrain Classification
gfMb

N. T. S. Sheet
92N

Soil Moisture Subclass
SUBHUMID

Soil Drainage
WELL

Perviousness
MODERATELY

Free Water
ABSENT

Flood Hazard
NO HAZARD

Depth to: (cm.)
(- if absent)

a. water table	—
b. rooting (effective)	32
c. root restricting layer	—
d. frozen layer	—
e. bedrock	—
f. carbonate	32
g. salinity	—

Particle Size Analysis

Horizon Desig.	>2 mm %	<2mm %	Sand %	Silt %	Clay %	Class
LF						
Ah						
Ae						
Bm1	35	65	20.9	39.6	39.5	cl
Bm2	22	78	19.7	36.6	43.7	c
BC	5	95	21.8	41.5	36.7	cl
Ck	25	75	23.5	53.2	23.3	sil

Chemical Analysis

Horizon Desig.	pH (Water)	Organic C (%)	Total N (%)	Available P (ppm)	Available S (ppm)	Exchangeable Ca (me/100g)	Exchangeable Mg (me/100g)	Exchangeable Na (me/100g)	Exchangeable K (me/100g)	Pyrophosphate Fe (%)	Pyrophosphate Al (%)	Pyrophosphate Mn (ppm)	Se (ppm)	Hg (ppb)
LF														
Ah														
Ae														
Bm1	5.0	2.18	0.189	4.3	2.0	7.8	1.8	0.12	0.12	0.69	1.25	27		
Bm2	5.3	2.14	0.247	3.8	1.1	13.5	2.6	0.13	0.13	0.75	1.58	40		
BC	5.4													
Ck	7.3												5	160

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Soil Association SCOOP LAKE

Plot Number [illegible]

Horizon Desig	Horizon Depth cm	Horizon Thickness cm		Horizon Boundary		Coarse Fragment Descript.							Soil Texture < 2mm	Structure							
						% by vol.	Gravel <7.5cm		Cobbles 7.5 - 25 cm		Stones >25 cm			Primary				Secondary			
		Min.	Max.	Dist.	Form		%	Type	%	Type	%	Type		Grade	Class	Kind	Kind Mod	Grade	Class	Kind	Kind
LF	5-0	3	5	C	S																
Ah	0-5	3	6	G	W	40	50	S	30	S	20	S									
Ae	5-8	3	5	G	W	40	50	S	30	S	20	S	sil	W	FM	PL					
Bm1	8-16	5	8	D	S	40	50	S	30	S	20	S	cl	WM	M	SBK					
Bm2	16-23	8	9	D	S	40	50	S	30	S	20	S	cl	WM	FM	SBK					
BC	23-32	9	12	C	S	40	50	S	30	S	20	S	cl	WM	M	SBK		WM	F	SBK	
Ck	32-55+					40	50	S	30	S	20	S	gsil	W	M	SBK					

Horizon Desig.	Mst.	Consist.				Colour 1		Colour 2		Mottles						Roots 1				Roots 2			
										Ab.	Si.	Co.	Colour		Bound. Dis.	Ab.	Size	Ori.	Dist.	Ab.	Size	Ori.	Dist
	D M W	dry	moist	wet	plast	aspect		aspect		F C M	F M C	F D P	aspect		D C G S	V F P A	V F M C	V H O R	IN EX MX	V F P A	V F M C	V H O R	IN EX MX
LF																							
Ah																							
Ae	M		2	2	2	1	10 YR 4/4									F	F	H	MX				
Bm1	M		2	2	3	1	10 YR 4/4									P	F	O	MX				
Bm2	M		2	3	3	1	10 YR 3/2									P	F	H	MX				
BC	M		3	3	3	1	10 YR 2/1									P	F	H	MX				
Ck	M		2	2	2	1	7.5 YR 2/0									F	M	O	MX				

Horizon Desig.	Pores							Hor. Por.	Clay Films			Effer.	Organic Material Description							Fiber Analysis		
	Ab.	Size	Ori.	Dist.	Cont.	Mor.	Type		Freq.	Thi.	Loc.	Deg.	Material Composit.			Woody Material		Pyro. Index	von Post Scale	Unrubbed Fiber %	Rubbed Fiber %	Pyro Index
													Kind 1	Kind 2	Decom. N S M H	Hard S SH H VH	Vol. 0-1-2-3-4					
	V F P A	V F M C	V H O R	IN EX MX	CO DC	S D C	V I T	S M H	F C M CS	TN MTK TK VTK	0 to 8	VW W M S										
LF																						
Ah																						
Ae	F	M	R	MX	CO	D	I	M														
Bm1	P	F	R	EX	CO	D	V	M														
Bm2	P	F	R	EX	CO	D	I	M														
BC	P	F	R	EX	CO	D	I	M	C	TN	2											
Ck	F	F	R	EX	CO	D	I	M				S										

TT Tourist Association

Map Units of the Tourist Association

TT - This map unit consists of moderately well drained, Gray Luvisol soils developed on lacustrine materials or bedrock. (Terrain Unit: sLb)

A profile description of a Tourist Association soil is not available.

7.10 LAND TYPE - BEDROCK OUTCROPS

Bedrock outcrops are classified as non-soil and as such are mapped as a land type. The bedrock map units are separated on the basis of the types of modifying processes which are active or have been active on them, plus the soils which are associated with them in the various regions of the survey area.

Map Units of the Bedrock Outcrop Land Type

R - This map unit consists of bedrock outcrops occuring throughout the survey area which may be hummocky, steep, ridged, terraced, subdued or undefined.
(Terrain Units: R, Rs, Rh, Rt, Rm)

R-AN - Angus Creek Association soils occupy a significant portion of this map unit in the Liard Plain - north region.
(Terrain Units: R/C, Rs/C, R = C, R//C)

R-BK - Boya Creek Association soils occupy a large portion of this map unit in the Rabbit Plateau region.
(Terrain Unit: R/C)

R-BK$_1$ - Apron shaped Boya Creek Association soils occupy a minor portion of this map unit in the Rabbit Plateau region.
(Terrain Unit: R//Ca)

R-CC$_1$ - Shallow (<1 m) Cosh Creek Association soils occupy a minor portion of this map unit in the Liard Plain - north region.
(Terrain Unit: R//Mv)

R-CH - Chalford Creek Association soils occupy a significant portion of this map unit in the Liard Plateau region.
(Terrain Units: R//C, R/C, R-V/C, Rs/C)

R-CH-MH$_2$ - Chalford Creek Association and shallow (< 1 m) Mt. Halkett Association soils occupy significant portions of this map unit in the Liard Plateau region.
(Terrain Unit: R/C//Mv)

R-CH$_2$ - Shallow (< 1 m) Chalford Creek Association soils occupy a significant portion of this map unit in the Liard Plateau region.
(Terrain Units: R/Cv, R = Cv, R = Rs/Cv)

R-CH$_2$-MH$_2$ - Shallow (< 1 m) Chalford Creek and Mt. Halkett Associations soils occupy significant segments of this map unit in the Liard Plateau region.
(Terrain Units: Rs = Cv/Mv, R//Cv = Mv)

R-CH$_9$ - Cryoturbated Chalford Creek Association soils occupy a major portion of this map unit in the Liard Plateau region.
(Terrain Unit: R = Cv-C)

R-CK$_2$ - Shallow (< 1 m) Catkin Creek Association soils occupy a significant portion of this map unit in the Alberta Plateau region.
(Terrain Units: Rs = Cv, Rrs = Cv, Rs/Cv, Rs//Cv, Rs/R = Cv, R = Cv)

R-CK$_2$-IL$_3$ - Shallow (< 1 m) Catkin Creek Association and level Irene Lake Association soils occupy significant portions of this map unit in the Alberta Plateau region.
(Terrain Unit: Rs = Cv//Fl)

R-CK$_2$-RC$_1$ - Shallow (< 1 m) Catkin Creek Association and Ruthie Creek Association soils occupy significant portions of this map unit in the Alterta Plateau region.
(Terrain Unit: Rrs = Cv//Mv)

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R-CM$_1$ - Shallow (<1 m) Chee Mountain Association soils occupy a major portion of this map unit in the Rabbit Plateau region.
(Terrain Unit: R = Mv)

R-CR - Coal River Association soils occupy a large portion of this map unit in the Liard Plain - north region.
(Terrain Units: R/C, Rs/C

R-CS$_1$ - Shallow (<1 m) Crusty Creek Association soils cover a large segment of this map unit in the Rocky Mountain Foothills region.
(Terrain Unit: R/Mv)

R-CS$_1$-HA$_4$ - Shallow (<1 m) Crusty Creek and Hell Gate Association soils occupy significant portions of this map unit in the Rocky Mountain Foothills region.
(Terrain Unit: R/Mv/Cv)

R-DC - Davie Creek Association soils occupy a significant segment of this map unit in the Liard Plain - south region.
(Terrain Units: R//C, Rs/C, R-C, R/C)

R-DC$_3$ - Davie Creek Association soils developed on landslide deposits occupy a large portion of this map unit in the Liard Plain - south region.
(Terrain Unit: Rs/Ch)

R-EW$_4$ - Shallow (<1 m) Ewe Mountain Association soils occupy a large portion of this map unit in the Rocky Mountain Foothills region.
(Terrain Unit: R/Mv)

R-EW$_4$-MR$_5$ - Shallow ($<$1 m) Ewe Mountain and McLearn Mountain Association soils cover significant portions of this map unit in the Rocky Mountain Foothills region.
(Terrain Unit: R = Mv = Cv)

R-GA$_3$-JS$_5$ - Shallow ($<$1 m) Grayling River and Jane Smith Creek Association soils occupy significant portions of this map unit in the Liard Plateau region.
(Terrain Units: R/Mv = Cv plus R-Cv/Mv plus R/Cv)

R-GL - Graveyard Lake Association soils occupy a large portion of this map unit in the Liard Plain - south region.
(Terrain Unit: R/C

R-HA$_4$ - Shallow ($<$1 m) Hell Gate Association soils occupy a significant portion of this map unit in the Rocky Mountain Foothills region.
(Terrain Units: Rs/Cv, R = Cv, R = Cvb, R/Cv)

R-HA$_4$-CS$_1$ - Shallow ($<$1 m) Hell Gate and Crusty Creek Association soils cover a significant portion of this map unit in the Rocky Mountain Foothills region.
(Terrain Units: R = Cv//Mv, R/Cv/Mv)

R-HL$_2$ - Shallow ($<$1 m) Hare Lake Association soils occupy a large portion of this unit in the Liard Plain - south region.
(Terrain Unit: R/Mv)

R-JS - Jane Smith Creek Association soils occupy a significant segment of this map unit in the Liard Plateau region.
(Terrain Units: R/C, R//C)

R-JS$_5$ - Shallow (<1 m) Jane Smith Creek Association soils occupy a significant portion of this unit in the Liard Plateau region.
(Terrain Units: R/Cv, Rt = Cv, R = Rs/Cv, Rs = Cv)

R-KR$_6$ - Deep (>1 m) mantled Kechika River Association soils occupy a major portion of this map unit in the Liard Plain - south section.
(Terrain Unit: R = Fb)

R-LI - Liard Tom Creek Association soils occupy a large portion of this map unit in the Liard Plain - north region.
(Terrain Unit: R/M)

R-LI$_3$ - Shallow (<1 m) Liard Tom Creek Association soils occupy a significant portion of this map unit in the Liard Plain - north region.
(Terrain Units: Rh/Mv, R//Mv, R/Mv)

R-ME-MH$_2$ - Moule Creek Association and shallow (<1 m) Mt. Halkett Association soils cover significant segments of this map unit in the Liard Plateau region.
(Terrain Unit: R = Ov = Mv)

R-MH - Mt. Halkett Association soils occupy a significant portion of this map unit in the Liard Plateau region.
(Terrain Units: R = M, R/M)

R-MH$_2$ - Shallow (<1 m) Mt. Halkett Association soils occupy a significant portion of this unit in the Liard Plateau region.
(Terrain Units: R = Mv, R/Mv)

R-MH$_2$-CH$_2$ - Shallow ($<$1 m) Mt. Halkett and Chalford Creek Association soils occupy significant portions of this map unit in the Liard Plateau region.
(Terrain Unit: R = Mv = Cv)

R-MH$_{13}$ - Cryoturbated Mt. Halkett Association soils occupy a major portion of this map unit in the Liard Plateau region.
(Terrain Unit: R = Mv-C)

R-ML - Muncho Lake Association soils occupy a significant portion of this map unit in the Rocky Mountain region.
(Terrain Units: R = C, R//C, Rs/C, R-V/C, R/C, Rm//C, Rs = C plus Rs/C-V)

R-ML$_2$ - Apron shaped Muncho Lake Association soils occupy a minor segment of this map unit in the Rocky Mountain region.
(Terrain Unit: R//Ca)

R-ML$_3$ - Shallow ($<$1 m) Muncho Lake Association soils occupy a significant portion of this map unit in the Rocky Mountains region.
(Terrain Units: R/Cv, R-Cv)

R-MR$_5$ - Shallow ($<$1 m) McLearn Mountain Association soils occupy a significant portion of this map unit in the Rocky Mountain Foothills region.
(Terrain Units: R/Cv, Rs//Cv, R = Cv)

R-MR$_5$-EW$_4$ - Shallow ($<$1 m) McLearn Mountain and Ewe Mountain Association soils cover significant segments of this map unit in the Rocky Mountain Foothills region.
(Terrain Units: R = Cv/Mv, R/Cv/Mv)

R-MR$_8$ - Soliflucted McLearn Mountain Association soils occupy a minor portion of this unit in the Rocky Mountain Foothills region.
(Terrain Unit: R//Cv-S)

R-NL$_4$ - Shallow (<1 m) Niloil Lake Association soils occupy a large portion of this map unit in the Liard Plain - south region.
(Terrain Unit: R/Mv)

R-PC$_5$ - Shallow (<1 m) Prochniak Creek Association soils cover a significant portion of this map unit in the Rocky Mountains region.
(Terrain Units: R/Cv/Rs, R = Cv)

R-TA - Turnagain Creek Association soils occupy significant portions of this map unit in the Kechika Ranges region.
(Terrain Units: Rs/C, R = C)

R-TE$_1$ - Steep Teeter Creek Association soils occupy a minor segment of this map unit in the Liard Plateau region.
(Terrain Unit: Rs//Fs)

R-TO$_2$ - Shallow (<1 m) Trout River Association soils occupy a minor portion of this map unit in the Rocky Mountains region.
(Terrain Unit: R//Mv)

R-VC - Vents Creek Association soils occupy a significant portion of this map unit in the Rabbit Plateau region.
(Terrain Units: R/C, Rs-V//C, Rs/C)

R$_1$ - This map unit is failing in the Alberta Plateau, Kechika Ranges and Liard Plateau regions.
(Terrain Units: R-F, Rs-F, R-FS)

R_1-JS$_{10}$ - This map unit is failing in the Liard Plateau region.
(Terrain Unit: Rs = Cv-F)

R_1-MR$_{15}$ - This map unit is failing and the McLearn Mountain Association soils are also subject to solifluction in the Rocky Mountain Foothills region.
(Terrain Unit: R = Cav-FS)

R_2 - This map unit is gullied and sometimes subject to avalanching in the Alberta Plateau region.
(Terrain Unit: Rs-V, R-VA, R-AV, R-A)

R_2-CH$_1$ - This map unit is gullied in the Liard Plateau region.
(Terrain Units: R = C-V, Rs/Cv-V)

R_2-CK$_7$ - This map unit is gullied in the Alberta Plateau region.
(Terrain Units: Rs = Cva-V, Rs/Cv-V, Rs/Cvf-V, Rs = Cvb-V, Rs = Cba-V, Rs//Cvb-V, Rs-Cv-V)

R_2-HA$_6$ - This map unit is gullied and occurs in the Rocky Mountain Foothills region.
(Terrain Unit: Rs/Cv-V)

R_2-HA$_{10}$ - This map unit is gullied and subject to avalanching and occurs in the Rocky Mountain Foothills region.
(Terrain Unit: Rs/Cv-AV)

R_2-JS$_4$ - This map unit is gullied in the Liard Plateau region.
(Terrain Unit: Rs//Cv-V)

R_2-ML$_5$ - This gullied map unit occurs in the Rocky Mountain region.
(Terrain Units: Rs = Cv-V, Rs/Cv-V)

R_2-ML_6 - This map unit is gullied and subject to avalanching in the Rocky Mountains region. (Terrain Units: Rs/Cv-AV, Rs/C-AV, Rs/C-VA, Rs = C-VA)

R_2-MR_9 - This gullied map unit occurs in the Rocky Mountain Foothills region. (Terrain Units: R//Cv-V, Rs/Cv-V, Rs = Cv-V)

R_2-MR_{14} - This map unit is gullied and subject to avalanching in the Rocky Mountain Foothills region. (Terrain Units: Rs = Cv-AV, Rs//Cv-AV)

R_2-PC_2 - This gullied map unit occurs in the Rocky Mountains region. (Terrain Units: Rs/C-V, R = Cv-V)

R_2-TO - This map unit is gullied in the Rocky Mountains region. (Terrain Unit: R/M-V)

R_2-VC_1 - This map unit is gullied in the Rabbit Plateau region. (Terrain Unit: R = C-V)

R_3 - This map unit is subject to rapid mass wasting and occasionally to solifluction in the Alberta Plateau region. (Terrain Unit: Rs-R, R-SR, R-RS)

R_3-ML_7 - This map unit is subject to rapid mass wasting and solifluction in the Rocky Mountains region. (Terrain Units: R = Cv-S, Rs = Cv-SR, Rs/Cv-Rs)

R_3-ML_8 - This map unit is subject to rapid mass wasting in the Rocky Mountain region. (Terrain Unit: R = Cv-R)

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R_3-MR_3 - This map unit is subject to rapid mass wasting and solifluction in the Rocky Mountain Foothills region.
(Terrain Unit: Rs = Cvb-RS)

R_3-PC_{10} - This map unit is subject to solifluction in the Rocky Mountains region.
(Terrain Unit: R = Cv-SR)

R_4 - This map unit is failing and subject to rapid mass wasting in the Rocky Mountains region.
(Terrain Unit: Rs-RF)

R_4-CH_5 - This map unit is failing and subject to rapid mass wasting in the Liard Plateau region.
(Terrain Unit: Rs = Cv-FR)

R_4-HA_{12} - This map unit is failing and subject to rapid mass wasting in the Rocky Mountain Foothills region.
(Terrain Unit: Rs/Cv-RF)

R_5-MH_{10} - This map unit is subject to solifluction and cryoturbation in the Liard Plateau region.
(Terrain Units: R//Mv-CS, Rms//Mv-CS, Rms/Mv-CS, R/Mv-CS)

R_5-ML_{10}-TO_9 - This map unit is subject to cryoturbation and solufluction in the Rocky Mountains region.
(Terrain Unit: R = Cv = Mv-CS)

R_6 - This map unit is gullied, failing and occasionally cryoturbated in the Liard Plateau region.
(Terrain Units: Rs-FV, Rs-VF, R-C)

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R_6-CK_5 - This map unit in the Alberta Plateau region is failing and gullied.
(Terrain Units: Rs//Cv-FV, Rs/Cv-FV)

R_6-HA_{13} - This map unit is failing and gullied in the Rocky Mountain Foothills region.
(Terrain Unit: Rs//Cv-FV)

R_6-JS_5 - This map unit is gullied and failing in the Liard Plateau region.
(Terrain Units: Rs/Cvb-FV, $\frac{Fs}{R}$ = Cvb-FV, Rs//Cv-FV, Rs/CV-FV, Rs//Cv-VF, Rs//Cbv-FV)

R_6-PC_{11} - This unit in the Rocky Mountains region is failing and gullied.
(Terrain Unit: Rs/Cv-FV)

R_8 - This map unit is gullied, failing and subject to rapid mass wasting.
(Terrain Units: Rs-FVR, Rs-FRV, Rs-VRF)

R_8-ML_{12} - This map unit is gullied, failing and subject to rapid mass wasting in the Rocky Mountains region.
(Terrain Unit: Rs//Cv-VFR)

R_9 - This map unit is gullied, and subject to rapid mass wasting and occasionally avalanching.
(Terrain Units: Rs-RV, Rs-VR, Rs-VAR)

R_9-CK_9 - This map unit in the Alberta Plateau is gullied and subject to rapid mass wasting.
(Terrain Unit: Rs = Cv-VR)

R_9-HA_7 - This map unit is gullied and subject to rapid mass wasting in the Rocky Mountain Foothills region.
(Terrain Unit: Rs = Cv-VR)

R_9-MR_1 - This map unit in the Rocky Mountain Foothills region is gullied and subject to rapid mass wasting.
(Terrain Units: Rs/Cv-RV, Cv = Rs-VR, Rs = Cv-RV)

R_{10} - This map unit is gullied and subject to solifluction and occasionally avalanching.
(Terrain Units: R-VS, R-SV, R-AVS, R-SVA)

R_{10}-MR_6 - This map unit is gullied and subject to rapid mass wasting in the Rocky Mountain Foothills.
(Terrain Units: Rs = Cv-SV, R/Cv-VS)

R_{11} - This map unit is gullied, failing and subject to solifluction.
(Terrain Units: R-VSF, Rs-VFS)

R_{12} - This map unit is gullied and subject to rapid mass wasting and solifluction.
(Terrain Units: Rs-VSR, Rs-SVR, Rs-VRS)

R_{13} - This bedrock is gullied and subject to rapid mass wasting and cryoturbation.
(Terrain Unit: R-VRC)

R_{14} - This bedrock is subject to avalanching and rapid mass wasting.
(Terrain Unit: R-RA)

R_{15} - This bedrock exhibits karst features.
(Terrain Units: Rh-K, Rm-K, R-K)

PRELIMINARY

Chapter 8

SOIL FORMING PROCESSES AND IMPACTS OF FLOODING

8.1 INTRODUCTION

Soil has many meanings to many people depending on their inclination, training and experience. To a planner soil is a natural resource critical for sustenance of a certain human population. To an engineer it is unconsolidated material which may be manipulated for construction purposes. To a forester or an agriculturist, soil is a medium for plant growth. To a farmer, soil is his livelihood, his "life blood". To a pedologist soil is all of these things and much more.

Soil is a naturally occurring, dynamic, three-dimensional body at the earth's surface which has been formed by nature and has recorded its own history expressed in recognizeable morphological, physical and chemical characteristics. Pedologists have defined soil in general terms as the naturally-occurring, unconsolidated material, mineral or organic material at the earth's surface which is capable of supporting plant growth. Soils are a continuum across the landscape grading one into another but having highly variable properties. The properties of individual soils vary with depth and are the product of climatic factors and organisms, as conditioned by relief and water regime, acting through time on geologic materials (soil parent materials). These five factors (climate, organisms, relief, time and parent materials) are interdependent and thus the intensity of expression of one or all determines the rate, direction and intensity at which the pedogenic processes proceed. A change in any one of these factors results in a change in the soil development.

A soil profile is produced by additions to (enrichment), losses from (leaching, erosion), translocations within a soil body (eluviation, illuviation, decalcification, calcification, lessivage, pedoturbation, podzolization, gleization), and transformation of materials within a soil body (decompostion, synthesis, humification, mineralization, gleization) (Buol, Hole, McCracken, 1973).

8.2 IMPACTS OF RESERVOIR DEVELOPMENT ON SOIL FORMING PROCESSES

All of the previously described processes are functioning in the soils of the Liard River survey area. However, when the soils become inundated by the water of a reservoir the intensity of some of these processes increases and that of others decreases. Where reservoir levels are to remain relatively constant those soils which are inundated become non soils. Those soils which are at the upper levels of the reservoir and are subject to fluctuating water levels become affected primarily by the processes of gleization, leaching, erosion and pedoturbation.

This is discussed more fully in the sections following.

8.2.1 Beaver Crow Reservoir System

Presently, there exist various soil types along the Liard River including Fibrisol, Eutric Brunisol, Dystric Brunisol, Regosol, Gray Luvisol and Gleysol soils. Wherever these soils occur below the proposed reservoir height of 390 m (1280 feet) elevation they will either become Gleysol soils or non soil depending on the amount of fluctuation in reservoir levels. With little fluctuation they become non soil since they would be under water and thus incapable of supporting plant growth. Where subject to fluctuation of reservoir levels they became Gleysol soils or Gleyed subgroups of the other soils, particularly at the upper limits of fluctuation.

Where any of the soil association or bedrock units are presently affected by gullying or are failing or subject to rapid mass wasting processes, these processes will be greatly accelerated by flooding.

The soil associations which are most likely to be affected by the Beavercrow Reservoir System include: the Beaver River, Catkin Creek, Eight Mile Creek, Grayling River, Hell Gate, Irene Lake, Jane Smith Creek, Mould Creek, Ruthie Creek, Scaffold Creek and Teeter Creek associations, particularly where they occur near or below the 390 m (1280 feet) elevation.

8.2.2 Devil's Gorge Reservoir System

Numerous soil types presently exists in the area which would be inundated by the proposed Devil's Gorge Reservoir System. The soil types found here include Eutric Brunisol, Dystric Brunisol, Regosol, Gleysol, Gray Luvisol, Humo-Ferric Podzol and Mesisol soils.

As with the Beavercrow Reservoir System those soils which are to be inundated will become either Gleysol soils or non soil depending on the amount of fluctuation to be allowed in the reservoir. Those soils which remain continuously under water become non soil. Those soils which are under water for long periods of time (i.e. those occurring near 571.5 m [1875 feet] elevation) become Gleysol soil. The soils above 571.5 m (1875 feet) elevation which are not inundated but which would have a high fluctuating water table will eventually become gleyed subgroups of whichever soil type they are at present. Some of these soils may even develop peaty surfaces through time.

Where soil or bedrock are presently affected by gullying, or are failing or are subject to rapid mass wasting processes, these processes can be expected to be accelerated by reservoir filling.

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The soil associations which may be affected by reservoir filling include: the Angus Creek, American, Birches Lake, Davis Creek, Deer River, Forcier Creek, Grayling River, Gemini Lakes, Gundahoo River, Guiding, Grizzly, Hare Lake, Hoole Creek, Hyland River, Jane Smith Creek, Kechika River, Lapie Creek, Liard Tom Creek, Mayfield Creek, McNab Lake, Mould Creek, Moose, Prochniak Creek, Red River and Teeter Creek associations.

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